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A Natural History Survey of the Manning Park Area

British Columbia

by

G. Clifford Carl, C. J. Guiguet,
and George A. Hardy

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A NATURAL HISTORY SURVEY OF THE MANNING PARK AREA, BRITISH COLUMBIA.

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G. Clifford Carl, C. J. Guiguet, and George A. Hardy.

Issued July, 1952.

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A Natural History Survey
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Manning Park Area, British Columbia,

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CONTENTS

Introduction 1

Topography 3

Climate 4

Vascular Plants 6

Mammals 60

Birds 78

Reptiles 105

Amphibians 106

Fishes 108

Butterflies and Moths 109

Wood-boring Beetles 116

Other Invertebrates 122

- Grasshoppers 122
- Spiders 123
- Ticks 123
- Plankton Crustacea 123
- Molluscs 124

Acknowledgment 125

References 126

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INTRODUCTION

Manning Park, an area recently opened to the public by the completion of the Hope-Princeton Highway, is of considerable general interest both to residents of the Province and to tourists from other parts. Being readily available to large numbers of visitors the Park will undoubtedly be used a great deal and information concerning its plants and animals will be in constant demand. Moreover, because of its location in the Cascade Mountains immediately north of the International Border this area is of special interest to students of wildlife. Not only does it contain representatives of both coastal and interior species but also it allows one to observe the distributions of these animals and plants during a relatively short interval of time while driving over the Highway which now traverses the Park.

With these interests in mind members of the Provincial Museum staff visited this region on several occasions in order to record what plants and animals are to be found there and to study their limits of range and the general nature of their distribution before these features are too disturbed by park development and use. Four separate visits were made to the Manning Park region; the areas covered, the working dates, and the personnel of the parties are as follows:

Manning Park east of Allison Pass, including Three Brothers area and Lightning Lakes	July 21 - August 16, 1945.	G. C. Carl, G. A. Hardy, F.L Beebe

Skagit Valley and Lone Goat Mountain	May 30 - June 8, 1947	G. C. Carl, G. A. Hardy, J. D. Yarwood
Hope-Princeton Highway up to Mile 23 and including Canam Mine area	July 13 - 21, 1949	G. C. Carl, G. A. Hardy, C. J. Guiguet
Hope-Princeton Highway entire length and approach to Marmot Mountain	May 25 - June 1, 1950	G. C. Carl, G. A. Hardy, C. J. Guiguet

In addition to the above the British Columbia Forest Service employed Mr. R. York Edwards to make a faunal survey of the park during the period May 10 to September 13, 1949. A portion of Mr. Edwards' report is included in this account.

Other field work carried out in the vicinity of the Park includes that of Professor John Davidson who made a botanical survey through the park area in 1912 while Provincial Botanist, and that of H. M. Laing and E. H. Young who traversed the area just north of the present boundaries in 1927 under the auspices of the National Museum of Canada. Small botanical collections have also been made in the Park and vicinity by Rev. John Goodfellow of Princeton and by members of the Vancouver Natural History Society. The present report is a compilation of all data resulting from these several sources.

The Park proper consists of 176,080 acres set aside in 1941 as a Provincial recreational area in memory of E. C. Manning, late Chief Forester, who was killed in a plane accident on February 6 of that year. It remained relatively inaccessible to visitors until October, 1949, when the Hope-Princeton Highway was opened to the public. A Ranger Station, a large concession building, and a number of cabins have been constructed near the old Cambie Camp site to serve the Park and its visitors, and a programme of Park development has been inaugurated.

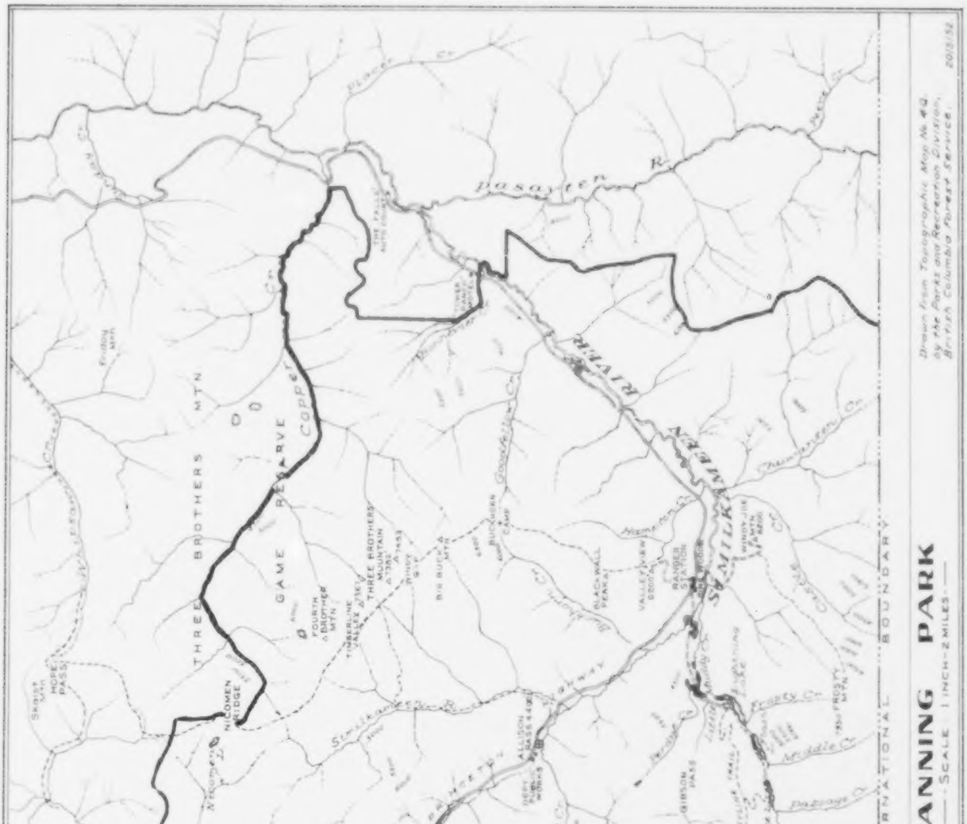
MANNING PARK
SCALE 1 INCH = 2 MILES
INTERNATIONAL BOUNDARY
LEGEND
Highway
Jeep Road
Trail
Composite
Drawn from Topographic Map No 49 by the Parks and Recreation Division, British Columbia Forest Service.
THREE BROTHERS MTN
GAME RESERVE
SIMILKAMEEN RIVER
SKAGIT RIVER
SKAGIT R
HOPE PRINCETON HIGHWAY
Pasayten R.
Copper Cr.
NICOMEN RIDGE
HOPE PASS
BLACKWALL PEAK
RANGER STATION
GIBSON PASS
LIGHTNING LAKE
FROSTY MTN
ALLISON PASS
Skagit Mtn
Friday Mtn
Hozameen
Chuwanten Cr.
Passage Cr.
Nepopekum Cr.
Middle Cr.
Frosty Cr.
Skaist R.

Fig. 1.

TOPOGRAPHY

Because Manning Park is situated in the Coast Range the area is one of topographical transition. The western and southern portions of the Park and their approaches are extremely rugged with many high peaks, some covered with permanent snow. In much of the eastern half of the Park and as far north as the eye can see, however, the country is a series of rounded mountains and tablelands deeply cut by streams and rivers. This change in character can best be seen from a vantage point such as the summit of the Three Brothers Mountain, from which location one can see to the west and south a confusion of sharp peaks on the horizon including Mount Baker and Mount Hozameen, both in the State of Washington, and to the east, rolling country covered with dense stands of jack pine and open stands of Douglas fir giving way to the arid rangeland typical of the interior plateau.

Most of the Park consists of sedimentary rock with a relatively few isolated examples of intrusive rocks in evidence (Rice 1942). Rocks of the intrusive type form part of Frosty Mountain, a prominent feature of the Park near the southern boundary. Since this peak dates from the Cretaceous period it is probably the youngest formation in the Park. China Wall, a volcanic dyke, is a conspicuous feature in the area just east of the eastern boundary; it is best seen looking south from a point near Mile 57 on the Highway.

The Skagit Valley is a relatively flat lowland immediately west of the present western boundary of the Park extending into the State of Washington to the south. The valley bottom lies at an elevation of about 2,000 feet and is traversed by the meandering Skagit River which flows southward. In time the lower end of the valley will be flooded by a lake to be created by the construction of a dam in connection with a power project on the Skagit River in Washington. About three miles north of the International Border and in the area to be flooded, the old Whitworth Ranch is located, the headquarters for the Museum party in 1947. In this area the dominant topographical features are Mount Hozameen just across the border to the southeast and Shawatum (Steamboat) Mountain, elevation 7081 feet, to the northeast. The valley itself is flanked by ranges of the coast mountains which rise abruptly from the valley floor.

Entrance to the valley is gained by a logging road up Silver Creek Valley which was the route of the old trail to Whitworth Ranch and points south and east. Near the ranch the Princeton trail branches off to climb eastward over the ridge at 6,000 feet elevation past Lone Goat Mountain and Lightning Lakes via the Skyline Trail and across the Similkameen near the present site of Pinewoods.

The Canam Mine area which the Museum party visited in 1949 is situated at an altitude of about 5,000 feet near the headwaters of Silverdaisy Creek which enters the Skagit below its confluence with Snass Creek. The region is particularly subalpine in character with small meadowlands, talus slopes, and ridges rising to 6,500 feet on three sides. To the north of the mine-site is Mount Gordon (local name) with an elevation of 5,500 feet. The present western boundary of Manning Park runs almost north and south through this area.

Judging by the rounded nature of the topography the Manning Park area has been completely glaciated except for the angular peaks which probably projected above the ice. The valleys are deep and steep-sided as a result of being gouged out by ice-flows, and the exposed slopes often lack a covering of vegetation. Here, the soft sedimentary rock has weathered to form rock slides and talus slopes of which many are visible along the Highway.

Except for the Lightning Lakes and associated bodies of water there are no lakes of any size in the Park. Numerous pools and lakelets in the high country feed numbers of small alpine streams which in turn empty into the two major river systems, the Skagit flowing westward and the Similkameen flowing eastward. These streams are swift-running and subject to freshets with the result that their beds are periodically scoured.

CLIMATE

Very little authoritative information is available concerning climate in Manning Park since no official records exist at this time. However, meteorological data are available for Hope (Little Mountain) and for Princeton which are respectively west and east of the Park. These, as given for 1950 in "Climate of British Columbia," are as follows:

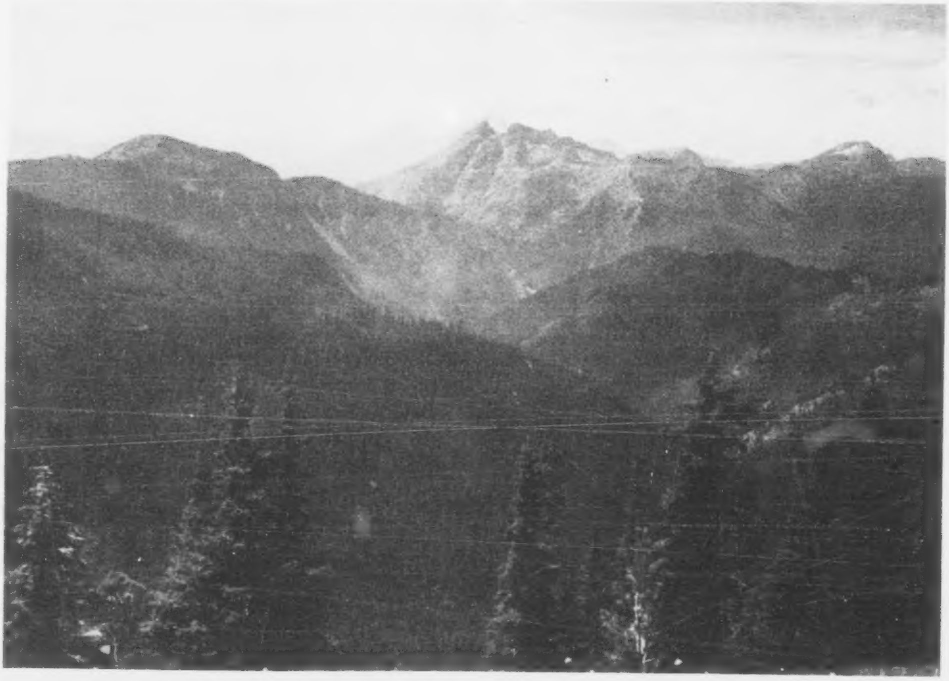

Fig. 2. Looking northwest from Frosty Mountain (7,950 feet); Three Brothers Mountain on horizon at right.
(Photo by R. York Edwards.)

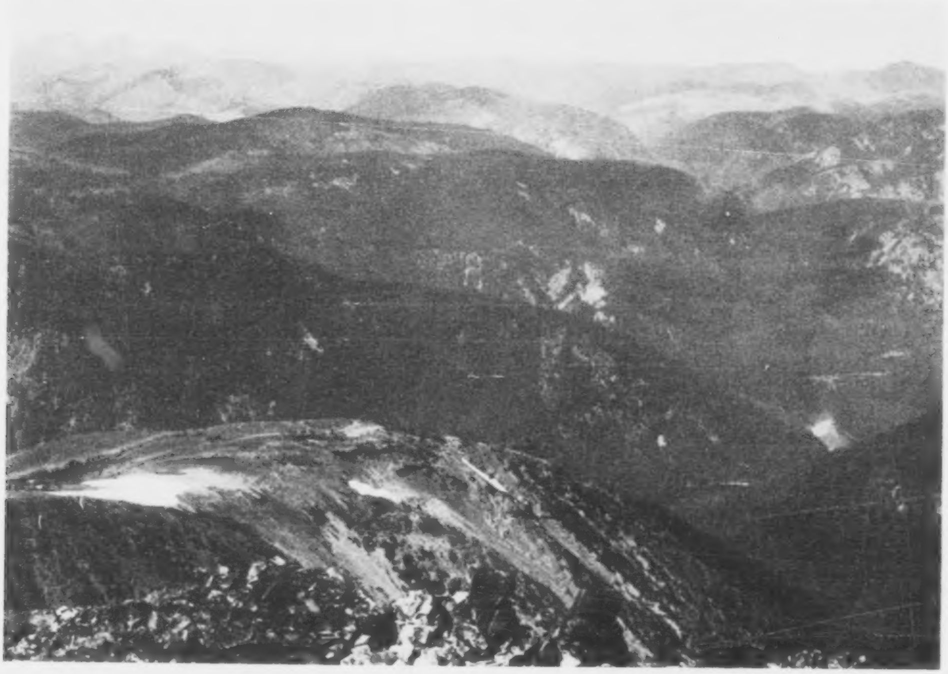

Fig. 3. View toward Coast Range from Skyline Trail.

(Photo by British Columbia Forest Service.)

Average Monthly Mean Temperature in Degrees F.

	J	F	M	A	M	J	J	A	S	O	N	D	Year
Hope	29	34	41	48	55	59	64	63	58	49	39	32	48
Princeton	17	25	33	43	51	58	63	62	55	43	30	23	42

Average Precipitation in Inches.

	J	F	M	A	M	J	J	A	S	O	N	D	
Hope	8.95	5.86	5.15	3.03	2.59	2.08	1.23	1.39	3.54	6.39	7.62	8.81	56.64
Princeton	1.31	1.47	0.64	0.75	1.13	1.47	1.01	0.80	0.83	1.19	1.79	1.85	14.24

In general the area west of the Park enjoys a relatively mild, wet climate typical of the coast while the region east of the Park is subjected to more severe conditions of temperature and drought characteristic of the interior of the Province. In the Park itself it is evident from the distribution of the flora that the area west of Allison Pass has a climate of the coastal type while east of the Divide the climate is more like that of the interior. Marked differences at least in amount of precipitation must also occur between west and east slopes of mountain ridges on either side of the Divide with the result that a complicated design of relatively wet and dry areas occurs in the Park area. Differences in elevation complicate the picture further in regard to temperature conditions.

Some indication of snowfall conditions is provided by a record kept at the Ranger Station at Pinewoods. Data from this source show that in the 1950-51 season snow was present on the ground continuously from November 13 to near the end of April and the maximum depth attained was 60 inches on January 24 and February 5 to 7. During most of February and the first three weeks of March the depth of snow remained at 50 inches or more.

VASCULAR PLANTS

As indicated in the general introduction one of the most interesting features of the flora of Manning Park is the fact that two climatic types meet here.

As a whole, the species are characteristic of the "Vancouver Strip"--that general assemblage occupying the region along the coast west of the Rockies from southern Alaska to California.

In all, five hundred and thirty species of vascular plants have been collected or recorded from the Manning Park area. Three main entities are represented in the Park:

(1) the dry, arid interior flora (5%) which includes the yellow pine-sagebrush association.

(2) the humid coastal and humid interior flora (85%) represented by the hemlock-cedar-Douglas fir forest;

(3) the alpine flora (10%) as represented by Phacelia sericae-Silene acaulis-Mimulus alpinus association.

These percentages are loosely approximate and are only mentioned to indicate the extremes in climatic adaptations.

Several species find the limit of their range here: Lyall's larch reaches its western limit, the woolly sunflower and Luina appear to reach their eastern extension of range in British Columbia, while the California rhododendron finds its northern or near northern limit in the Park.

Along the roadsides and trails and about campsites, a number of introduced weeds are making their first appearance, and will certainly be augmented by others as time goes by. It is hoped that records will be made of such as soon as they are observed, as in this way only can the history of the flora of Manning Park be accurately maintained. That new additions of native plants will be added from time to time is a certainty, for few of the valleys and slopes have been intensively studied botanically--some not at all--while observations on a seasonal basis have not been attempted.

The following list includes those plants taken by us, and also those recorded by Professor J. Davidson in the Annual Report of the Botanical Office for 1915. An attempt has been made to bring these names up to date, but some species, especially those collected by Macoun (J.M.M. in the list) have not been traced and have accordingly been excluded. Notes in quotation marks are from Davidson's list.

Ophioglossaceae--Grape-fern Family

Botrychium virginianum (L.) Sw. Grape Fern.

Dead Lake Swamp. Probably more common than collections indicate.

Botrychium lunaria Sw. Moonwort.

"Near Twenty-one mile House, Sumallo Valley."

Polypodiaceae--Fern Family

Cryptogramma acrostichoides R. Br. Parsley Fern.

On rock slides. Pinewoods, Skagit Valley.

Polypodium vulgare var. *hesperium* (Maxon) Nels. & Macbr.

Common Polypody. Pinewoods.

Phegopteris dryopteris (l.) Fee. Oak Fern.

Common, forming large drifts in moist shady places in the woods. Lightning Lakes, Allison Pass, Skagit Valley.

Phegopteris polypodioides Fee. Beech Fern.

"By side of trail in Nicolum Valley."

Adiantum pedatum var. *aleuticum* Rupr. Maidenhair Fern.

Growing in low, wet places in wood. Met with in one area only in Skagit Valley not far from Whitworth Ranch.

Cheilanthes siliquosa Maxon. Cliff Brake.

Rock face near Whitworth Ranch, Skagit Valley.

Athyrium filix femina v. *sitchense* Rupr. Lady Fern.

Common at and below the 4,000 foot level, from Pinewoods west to Skagit Valley, becoming more abundant on the lower levels to the west of Allison Pass.

Asplenium trichomanes L. Spleenwort.

"Frequent in Sumallo, Canyon, Skaist, and Lightning Lake Valleys."

Polystichum longchites (L.) Roth. Holly Fern.

"Nicolum Valley; Upper Canyon Valley."

Polystichum munitum (Kaulf.) Presl.

"Common in Sumallo and Upper Skagit."

Dryopteris dilatata (Hoffm.) A. Gray. Wood Fern.

Woods near Pinewoods and westwards.

Cystopteris fragilis (L.) Bernh. Bladder Fern.

Timberline Valley.

Woodsia oregana D.C. Eaton.

Timberline Valley.

Woodsia scopulina D.C. Eaton.

On rock slides throughout the Park at the lower elevations.

Equisetaceae--Horsetail Family

Equisetum arvensis L. Common Horsetail.

Pinewoods. Timberline Valley.

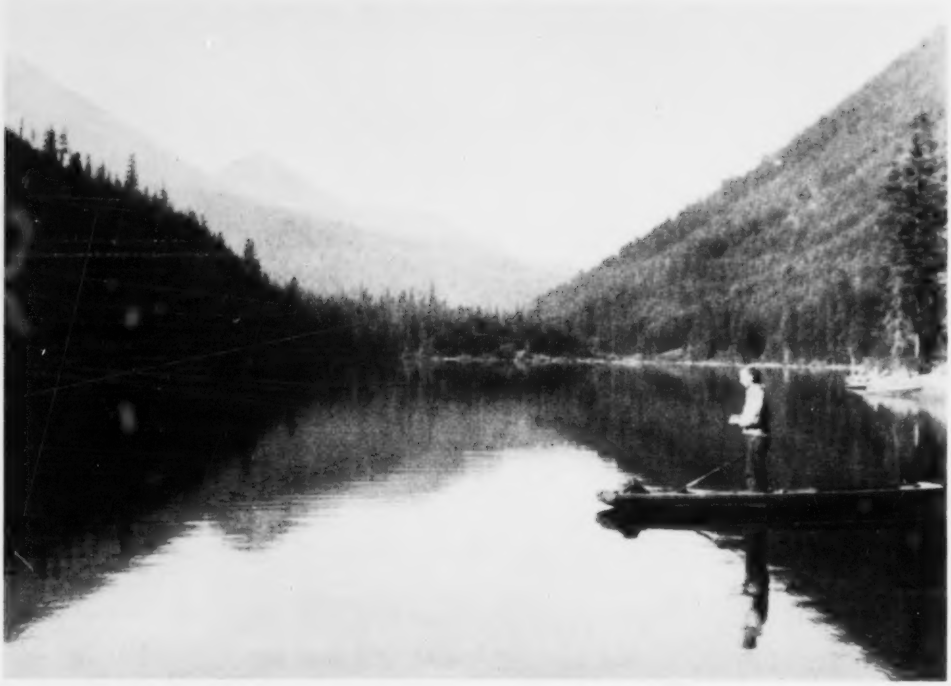

Fig. 4. Lightning Lake, looking toward Mount Hosameen.
(Photo by British Columbia Forest Service.)

Fig. 5. Junction of Similkameen and Little Muddy Creek Valleys (site of Pinewoods) from Valley View Lookout.

(Photo by R. York Edwards.)

Equisetum pratense Ehrk.

Pinewoods. Allison Pass.

Equisetum fluviatile L. Water Horsetail.

Abundant in shallows of Lightning Lake.

Lycopodiaceae- Club-Moss Family

Lycopodium selago L. Fir Club-Moss.

Timberline Valley.

Lycopodium clavatum L. Ground-pine, Elk Moss.

"Sumallo Valley."

Lycopodium annotinum L. Stiff Club-Moss.

Common in woods. Pinewoods, Lightning Lakes, Allison Pass.

Lycopodium complanatum L. Ground Cedar.

"Sumallo Valley."

Coniferae--Pine Family

Juniperus communis v. montana Ait. Juniper.

Timberline Valley. Canam Mine. A low-growing spreading species on dry hillside.

Juniperus scopulorum Sarg. Rocky Mountain Juniper.

Park Entrance, Goodfellow Creek. A small tree or shrub with many stems.

Thuya plicata Donn. Red Cedar.

Common west of Allison Pass. Characteristic of the rain forest.

Chamaecyparis nootkatensis (D. Don) Spach. Yellow Cedar.

"Frequent on higher slopes; rare in bottom of Skaist Valley." Not seen by us.

Pinus contorta Dougl. Lodgepole Pine. Scrub Pine.

One of the most abundant trees on the dry, gravelly benches east of Allison Pass where it forms a dense forest as far as the eye can see.

Pinus ponderosa Dougl. Western Yellow Pine.

The prevailing tree in the Princeton district, trailing out in the Park near Goodfellow Creek. An isolated stand of mature trees is reported west of the Skagit Valley near the International Boundary.

Pinus monticola Dougl. Western White Pine.

Scattered thinly through the forests west of Pinewoods.

Pinus albicaulis Engl. White-Bark Pine.

Only at altitudes of 6,000-7,000 feet. Timberline Valley, Canam Mine.

Larix Lyallii Parl. Lyall's Larch.

A small colony in Timberline Valley at 6,500 feet. One or two isolated and very small trees near Buckhorn Mountain on the way to Timberline Valley, about 6,000 feet.

Abies grandis Lindl. Balsam Fir.

"Frequent in Skaist Valley."

Abies lasiocarpa (Hook.) Nutt. Alpine Fir.

Common at higher levels near limit of timberline.

Abies amabilis Forbes. Lovely Fir.

At the 4,000-foot level, mixed with cedar and Englemann spruce.

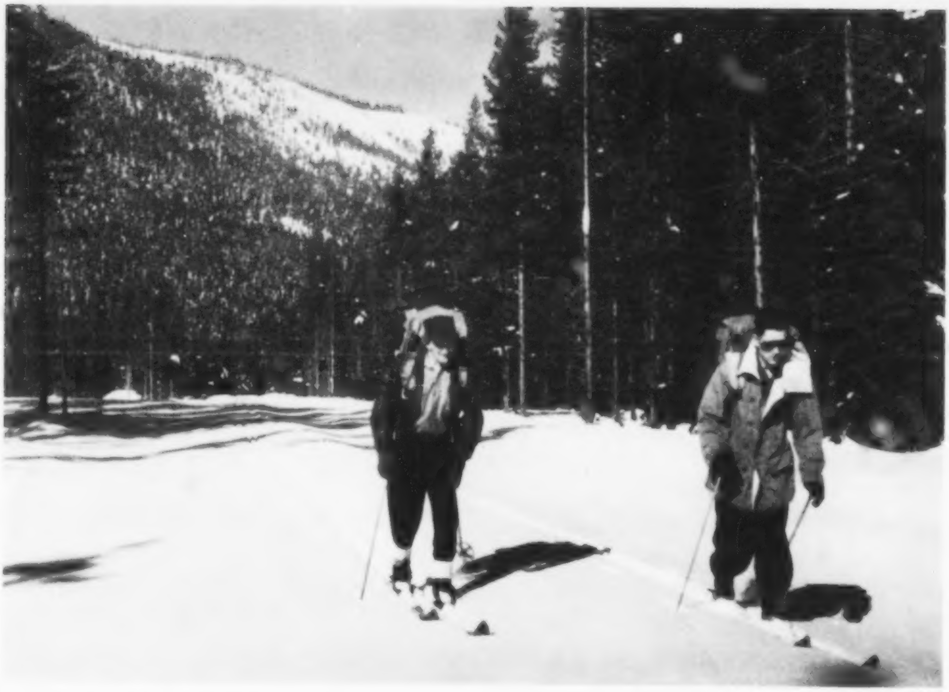

Fig. 6. Allison Pass, before the opening of the Highway.

(Photo by British Columbia Forest Service.)

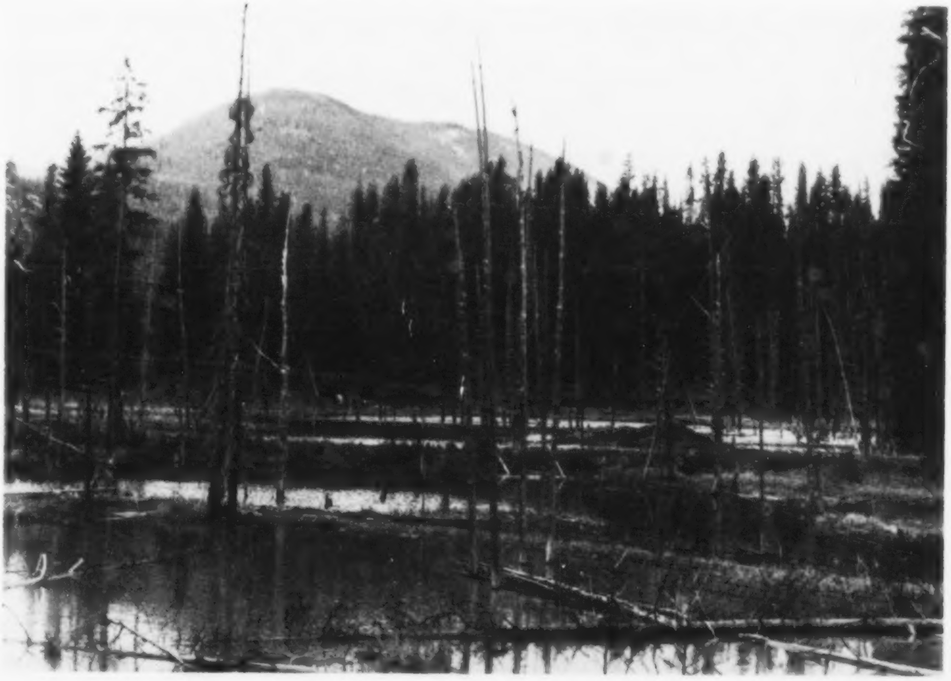

Fig. 7. Dead Lake, one mile east of Pinewoods.

Pseudotsuga taxifolia (Poir) Britt. Douglas Fir.

Common west of Allison Pass, gradually thinning out toward the eastern boundary of the Park.

Tsuga heterophylla Sarg. Western Hemlock.

Lightning Lakes, and in the cedar-hemlock forests west of Allison Pass, thinning out at Pinewoods.

Tsuga Mertensiana Carr. Mountain Hemlock.

"Common at high altitudes, near Mount Snaas and Granite Mountain." Canam Mine.

Picea Engelmanni Engelm. Englemann Spruce.

Abundant at the 4,000-foot level. Pinewoods, Allison Pass.

Picea sitchensis Carr. Sitka Spruce.

"Frequent throughout bottom of valleys. (Forms a forest in Cambie Valley)." Not seen by us.

Najadaceae--Pondweed Family

Potamogeton Richardsonii (Benn.) Rydb. Richardson's Pondweed.

Found floating in Perdue Lake, the only locality where it was seen.

Gramineae--Grass Family

Stipa occidentalis Thurb. Western Feather Grass.

Mountain slope near Pinewoods.

Stipa Williamsii Scribn. Williams' Feather Grass.

Near Pinewoods, dry, gravelly slope.

Phleum alpinum L. Alpine Timothy.

Timberline Valley. Common in the higher valleys.

Phleum pratense L. Common Timothy.

Goodfellow Creek. Skagit Valley. An introduced species, no doubt brought in with horse feed in the old pack-train days.

Cinna latifolia (Torr.) Griseb. Indian Reed Grass.

Lightning Lakes. Growing in shallow water.

Calamagrostis purpurascens R. Br. Reed Bent Grass. Pinewoods.

Calamagrostis canadensis v. macouniana (Vasey) Stebbins. Blue-joint Grass.

(As C. canadensis v. acuminata Vasey.)

"(J.M.M.) 1905."

Agrostis humilis Vasey. Bent Grass.

"Summit of Canyon Trail." Mountain meadows.

Agrostis scabra Willd. Bent Grass.

Pinewoods, Lightning Lakes, Goodfellow Creek.

Agrostis exarata Trin. Bent Grass.

"(J.M.M.) 1905."

Agrostis Rossae Vasey. Bent Grass.

Timberline Valley, mountain meadows.

Agrostis thurberiana Hitchc. Bent Grass.

Timberline Valley, Allison Pass.

Descampsia elongata (Hook.) Munro. Slender Hair Grass.

Lightning Lakes.

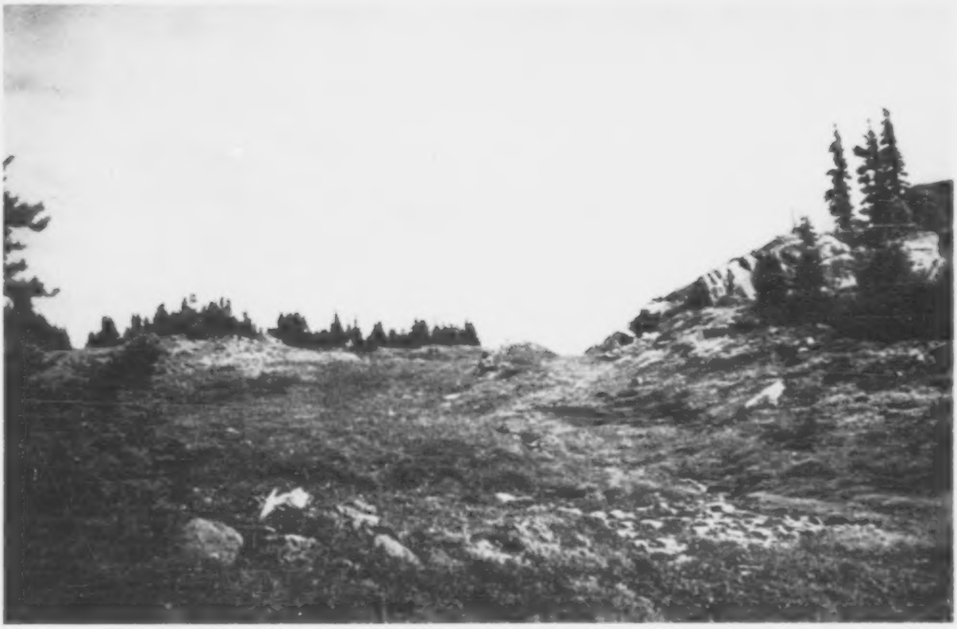

Fig. 8. Windy Gap (elevation about 6,500 feet), en route to Three Brothers Mountain.

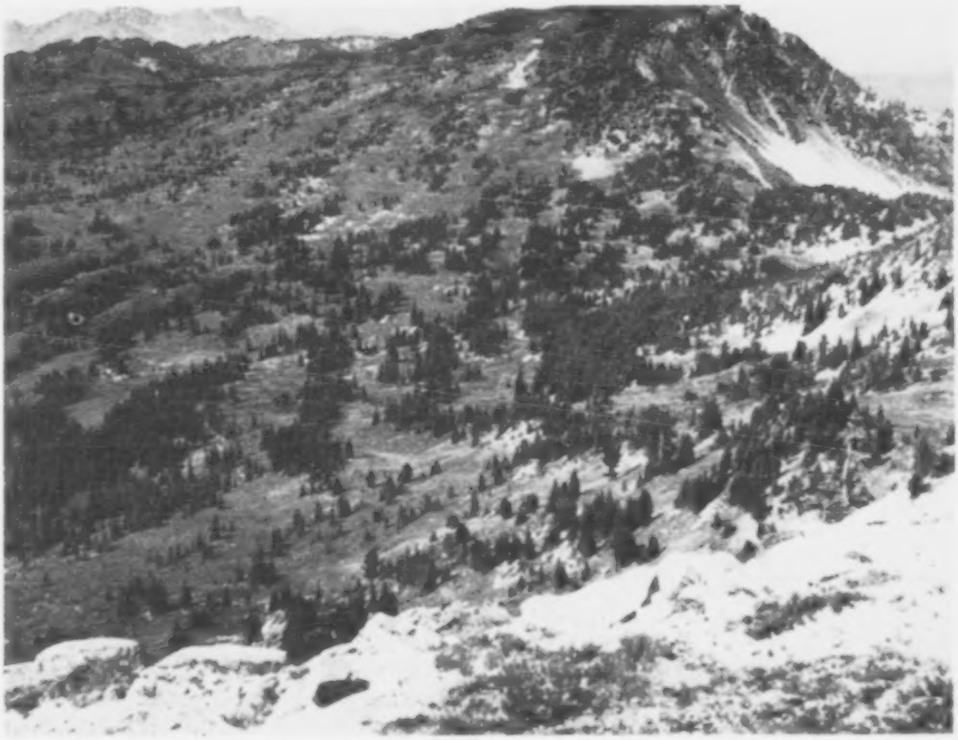

Fig. 9. Timberline Valley, Three Brothers Mountain area.

Descampsia atropurpurea (Whal.) Scheele. Mountain Hair Grass.

"Common at headwaters of Skaist, and Lightning Valley near Hosameen."

Trisetum spicatum (L.) Richter. False Oat Grass.

Timberline Valley, Pinewoods.

Trisetum canescens Buck. False Oat.

"Hope Trail."

Glyceria striata (Lam.) Hitchc. Manna Grass.

"(J.M.M.) 1905."

Glyceria elata (Nash.) Hitch. Manna Grass.

"Summit of Hope Trail."

Glyceria grandis Wats. Reed Meadow Grass.

Pinewoods, swamp land.

Glyceria pauciflora Presl.

"(J.M.M.) 1905."

Poa pratensis L. Kentucky or June Grass.

Lightning Lakes, Goodfellow Creek.

Poa epilis Schribn. Skyline Blue-grass.

Timberline Valley.

Poa stenantha Trin. Blue-grass.

Allison Pass.

Poa gracillima Vasey. Slender Blue-grass.

Timberline Valley, Allison Pass.

Poa palustris L. Fowl Blue-grass.

Pinewoods, Goodfellow Creek.

Poa arctica R. Br. Arctic Blue-grass.

"Northern slopes of Lightning Valley."

Poa secunda Presl. One-sided Blue-grass.

"Summit of Canyon Trail."

Poa compressa L. Canada Blue-grass.

"(J.M.M.) 1905."

Bromus marginatus Nees. Brome-grass.

Allison Pass, Goodfellow Creek.

Bromus Suksdorfii Vas. Suksdorf's Brome-grass.

Dead Lake.

Bromus inermis Leyss. Hungarian Brome-grass.

Lightning Lakes.

Bromus tectorum L. Downy Brome-grass.

Goodfellow Creek. An European species that is fast spreading over the dry slopes of the interior valleys.

Bromus vulgaris var. eximius Shear. Narrow-flowered Brome-grass.

"Canyon Trail."

Festuca ovina var. brackyphylla (Schult.) Piper. Sheep Fescue.

Timberline Valley.

Festuca occidentalis Hook. Western Fescue.

"(J.M.M.) 1905."

Festuca viridula Vasey. Green-leaf Fescue.

Timberline Valley, Lightning Lakes.

Festuca subsecundum (Link.) Hitchc. Bearded Wheat-grass.

"Summit of Canyon Trail."

Sitanion hystrix (Nutt.) Smith. Squirrel-tail.

Dry mountain slope north of Pinewoods and at Canam Mine. A species of arid hills and plains.

Elymus glaucus Buckl. Western Rye-grass.

Dead Lake swamp, near Pinewoods.

Cyperaceae--Sedge Family

Carex pyrenaica Wahl. Pyrenaen Sedge.

Timberline Valley.

Carex phaeocephala Piper. Mountain Hare Sedge.

Timberline Valley.

Carex macrochaeta C.A. Mey. Alaskan Long-awned Sedge.

Marmot Mountain, Timberline Valley (Second-Brother Mountain.)

Carex nigricans C.A. Mey. Blackish Sedge.

Marmot Mountain, Timberline Valley (Second-Brother Mountain.)

Carex laeviculmis Meinsh. Smooth-stemmed Sedge.

Allison Pass.

Carex sitchensis Prescott. Sitka Sedge.

Allison Pass.

Carex diandra Schrank. Lesser Panicled Sedge.

Dead Lake swamp, near Pinewoods.

Carex Garberi var. *bifaria* Fern. Garber's Sedge.

Pinewoods.

Carex viridula Michx. Grass Sedge.

Pinewoods.

Carex Rossii Boott. Ross' Sedge.

Allison Pass, Skagit Valley.

Carex Hindsii C.B. Clarke. Hinds' Sedge.

Allison Pass, Goodfellow Creek.

Carex canescens L. Silvery Sedge.

Goodfellow Creek, Pinewoods.

Carex rostrata Stokes. Beaked Sedge.

Allison Pass, Goodfellow Creek.

Carex brunnescens (Pers.) Poir. Brownish Sedge.

Allison Pass.

Carex pachystachya Cham. Thick-headed Sedge.

Allison Pass, Pinewoods.

Carex mertensii Prescott. Mertens' Sedge.

Allison Pass.

Carex exsiccata Bailey. Western Inflated Sedge.

Pinewoods.

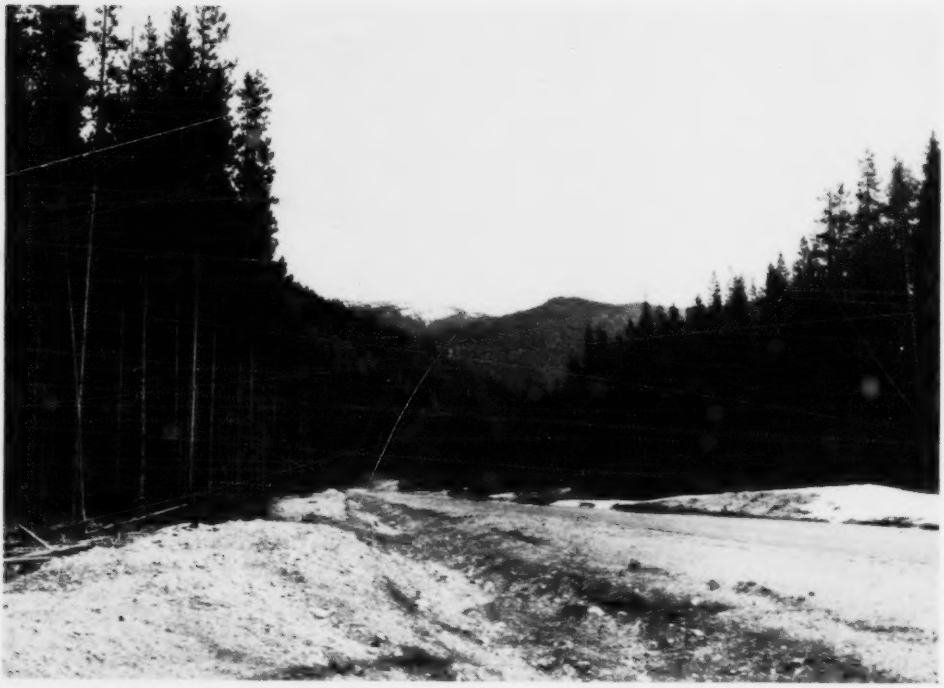

Fig. 10. Stand of lodgepole pine, east of Pinewoods (Mile 45).

Fig. 11. Similkameen River near Goodfellow Creek (Mile 49); note patches of deciduous trees, mostly aspen.

Carex Buxbaumii Wahl. Buxbaum's Sedge.

Pinewoods.

Carex leptopoda Mack. Short-scaled Sedge.

Skagit Valley.

Carex Hoodii Boott. Hood's Sedge.

Skagit Valley.

Carex Bolanderi Olney. Bolander's Sedge.

Skagit Valley.

Carex hepburnii Boott. Hepburn's Sedge.

"(J.M.M.) 1905."

Carex interior Bailey. Island Sedge.

"(J.M.M.) 1905."

Carex ablata Bailey. Cold-loving Sedge.

Timberline Valley.

Carex disperma Dewey. Soft-leaved Sedge.

Allison Pass, Dead Lake.

Carex Bebbii Olney. Bebb's Sedge.

"(J.M.M.) 1905."

Carex leptalia Wahl. Bristle-stalked Sedge.

"(J.M.M.) 1905."

Carex spectabilis Desv. Showy Sedge.

Timberline Valley.

Eriophorum angustifolium Roth.

Timberline Valley, on boggy flats.

Eriophorum Chamissonis C.A. Meyer.

"(J.M.M.) 1905."

Eriophorum gracile Koch.

"(J.M.M.) 1905."

Eleocharis palustris (L.) R. & S.

"(J.M.M.) 1905."

Juncaceae--Rush Family.

Luzula campestris var. multiflora (Ehr.) Celak. Common Wood-rush.

Skagit Valley.

Luzula Piperi Coville. Piper's Wood-rush.

Timberline Valley.

Luzula parviflora (Ehrh.) Desv. Small-flowered Wood-rush.

Allison Pass.

Luzula spicata DC. Spiked Wood-rush.

"Common in Canyon Valley, etc."

Luzula glabrata (Hoppe) Desv. Smooth Wood-rush.

"(J.M.M.) 1905."

Juncus drummondii E. Mey. Drummond's Rush.

Allison Pass, Timberline Valley.

Juncus ensifolius Wiks. Dagger-leaved Rush.

Allison Pass, Pinewoods.

Juncus mertensianus Bong. Merten's Rush.

Allison Pass.

Juncus longistylus Torr. Long-styled Rush.

Allison Pass.

Juncus filiformis L. Thread Rush.

"(J. M. M.) 1905."

Juncus Dudleyi Weig. Dudley's Rush.

"(J. M. M.) 1905."

Juncus Parryi Engelm. Parry's Rush.

"(J. M. M.) 1905."

Liliaceae--Lily Family.

Clintonia uniflora Kunth. Queen's Cup.

Pinewoods. In fruit (July); Canam Mine Trail. In flower (July).

Smilacina racemosa (L.) Desf. False Solomon's Seal.

Pinewoods.

Smilacina sessilifolia Nutt. Few-flowered False Solomon's Seal.

Pinewoods. Moist woods.

Streptopus amplexifolius (L.) DC. Large Twisted-stalk.

Allison Pass, Lightning Lake, Pinewoods.

Streptopus curvipes Vail. Smaller Twisted-stalk.

Canam Mine. Open thickets.

Veratrum viride Ait. False Hellebore.

Pinewoods, Canam Mine. Moist slopes.

Tofieldia occidentalis var. intermedia (Rydb.) Peck. False Asphodel.

Timberline Valley, Allison Pass. In bogs and wet places by stream sides.

Zygadenus venenosus Wats. Poison Camass.

West of Princeton.

Stenanthium occidentalis Gray. Western Mountain Bells.

Timberline Valley, Allison Pass. Shady stream sides.

Calochortus macrocarpus Dougl. Mariposa Lily.

Dry slopes on eastern border of Park. (C.P. Lyons.)

Erythronium grandiflorum Pursh.

Timberline Valley. On the edge of snow banks. All stages of flowering from seed to newly opened buds were found, depending on the recession of the snow bank, the open flowers being nearest to the snow (July).

Allium cernuum Roth. Nodding Onion.

Goodfellow Creek.

Allium acuminatum Hook. Hooker's Onion.

"West slopes of Hosameen Ridge."

Lloydia serotina (L.) S. Wats. Alp Lily.

"(J.M.M.) 1905."

Lillium montanum A. Nels. Mountain Lily.

Near eastern border of Park (C.P. Lyons.)

Lilium columbianum Hans. Columbia Lily.

Timberline Valley, Pinewoods, Goodfellow Creek, Skagit Valley. Frequent in open thickets and borders of fields.

Fritillaria lanceolata Pursh. Rice Root.

West of Princeton. (C.P. Lyons.)

Orchidaceae--Orchid Family

Calypso bulbosa (L.) Oakes. False Lady's Slipper.

Skagit Valley. Woods near Whitworth Ranch.

Habenaria saccata Greene. Slender Bog Orchid.

Timberline Valley, Allison Pass.

Habenaria dilatata (Pursh) Hook. Boreal Bog Orchid.

Timberline Valley, Pinewoods, Mile 20 Hope-Princeton Highway. Common in marshy places.

Habenaria unalaskensis (Spreng.) Wats. Alaska Orchid.

Allison Pass, Lightning Lake. Dry Banks.

Habenaria orbiculata Torr. Large Round-leaved Orchid.

"Coquihalla Flats."

Habenaria hyperborea (L.) R Br. Green-flowered Bog Orchid.

"(J.M.M.) 1905."

Listera cordata (L.) R. Br. Heart-leaved Twayblade.

Allison Pass, Lightning Lakes. Mossy ground in woods.

Peramium decipiens (Hook.) Piper. Menzies' Rattlesnake Plantain.

Allison Pass, Lightning Lakes.

Spiranthes Romanzoffiana Cham. Mist Maidens.

"(J.M.M.) 1905."

Salicaceae--Willow Family

Salix nivalis Hook. Snow Willow.

Timberline Valley. Forming mats two inches high or less.

Salix nivalis var. saximontana (Rydb.) Schn. Rocky Mountain Willow.

Timberline Valley. Similar to the above.

Salix Farrae Ball. Farr's Willow.

Pinewoods, Park entrance on east boundary.

Salix melanopsis Nutt. Dusky Willow.

Pinewoods, stream side.

Salix melanopsis var. bolanderiana (Rowlee.) Schn. Bolander's Dusky Willow.

Near eastern entrance to Park, along stream side.

Salix sitchensis Sanson. Sitka Willow.

Allison Pass, Lightning Lakes.

Salix Barclayi Anders. Barclay's Willow.

Allison Pass, Timberline Valley, Lightning Lakes.

Salix Scouleriana Barr. Scouler Willow.

Pinewoods. Goodfellow Creek. Common.

Salix subcoerulea Piper. Bluish Willow.

Pinewoods. Lower end of Lightning Lake.

Salix commutata Bebb. Variable Willow.

Timberline Valley. Marshy flat with *anglorum*.

Salix anglorum v. *kophophylla* Schneider. Alpine Willow.

Timberline Valley, 7,000 feet. Marshy flat with S. *commutata*.

Populus tremuloides Michx. Aspen.

Often growing luxuriantly among rock slides. Pinewoods.

Populus trichocarpa T. & G. Black Cottonwood.

Common along streamsides. Pinewoods. East entrance to Park.

Corylus californica Rose. Hazel.

Skagit Valley.

Betulaceae--Birch Family

Betula papyfera v. *subcordata* (Rydb.) Fern. Paper Birch.

Skagit Valley. Many fine trees were seen on the banks of the river.

Alnus sinuata (Regel.) Rydb. Sitka Alder.

Allison Pass, Pinewoods.

Alnus tenuifolia Nutt. Mountain Alder.

Allison Pass. Pinewoods.

Alnus rubra Bong. Red Alder.

"Common in Sumallo and Lower Skagit."

Urticaceae--Nettle Family

Urtica Lyallii S. Wats. Lyall's Nettle.

"(J.M.M.) 1905." Recorded by Davidson as U. cardiophylla. Rydb. but is more likely to be the above.

Santalaceae--Sandalwood Family

Commandra livida Rich. Sandalwood.

Allison Pass, Pinewoods. Dry open-wooded slopes.

Aristolochiaceae--Birthwort Family

Asarum caudatum Lindl. Western Wild Ginger.

Skagit Valley. Common in moist woods, both deciduous and coniferous.

Polygonaceae--Buckwheat Family

Eriogonum unbellatum subsp. majus Benth. Sulphur-flowered Eriogonum.

Allison Pass, Pinewoods. Rocky slopes.

Oxyria digyna (L.) Camptdera. Mountain Sorrel.

Timberline Valley. Rock crevices at higher levels.

Rumex crispa L. Curled Dock.

Goodfellow Creek, roadside.

Polygonum anchoreum Blake. Blake's Knotweed.

Goodfellow Creek.

Polygonum Douglasii Greene. Douglas Knotweed.

Allison Pass, Goodfellow Creek. Dry slopes in open woods.

Polygonum minimum S. Wats. Leafy Dwarf Knotweed.

Allison Pass, Pinewoods.

Polygonum viviparum L. Viviparous Knotweed.

Allison Pass. Marsh flats by stream.

Loranthaceae--Mistletoe Family

Arceuthobium americanum Nutt. Small Mistletoe.

Pinewoods. Parasitic on Pinus contorta.

Caryophyllaceae--Pink Family

Sagina saginoides var. hesperia Fern. Arctic Pearlwort.

Timberline Valley. Forming tiny circular mats on mud flats on edge of stream.

Arenaria formosa Fisch. Beautiful Sandwort.

Timberline Valley. Plentiful on higher slopes.

Arenaria lateriflora L. Side-flowered Sandwort.

Pinewoods. Woods.

Arenaria macrophylla Hook. Large-leaved Sandwort.

Timberline Valley. Woods.

Arenaria obtusiloba (Rydb.) Fern. Blunt-leaved Sandwort.

Timberline Valley.

Arenaria verna var. propinqua (Rich.) Fern. Alpine Sandwort.

Timberline Valley. Rock crevices and open, gravelly slopes.

Arenaria serpyllifolia L. Thyme-leaved Sandwort.

Lower Skagit.

Cerastium arvense L. Field Chickweed.

Skagit Valley.

Cerastium viscosum L. Sticky Mouse-eared Chickweed.

Pinewoods. No doubt seeds were brought in with agricultural or garden produce.

Stellaria borealis Bigelow. Northern Starwort.

Pinewoods. Swampy places.

Stellaria crispa Cham. & Schl. Chamisso's Starwort.

Allison Pass. Skagit Valley. Woodlands.

Stellaria longipes Goldie. Long-stalked Starwort.

Timberline Valley.

Stellaria longipes var. laeta (Rich.) Wats. Glaucous Starwort.

Timberline Valley.

Silene acaulis L. Moss Campion.

Timberline Valley. Gravelly pockets among rocks, at 7,000 feet.

Silene Menziesii Hook. Menzies' Campion.

Goodfellow Creek. Dry, wooded slopes.

Silene Macounii S. Wats. Macoun's Campion.

Timberline Valley.

Silene Douglasii Hook. Douglas' Campion.

"(J.M.M.) 1905."

Portulacaceae--Purselane Family

Lewisia columbiana (Howell) Rob. Columbia Lewisia.

Near summit of Lone Goat Mountain, on west side of Skyline Trail.

Claytonia lanceolata Pursh. Western Spring Beauty.

Edge of snow line, Skyline Trail; near Princeton.

Montia sibirica (L.) Howell. Siberian Miner's Lettuce.

Pinewoods.

Montia perfoliata (Donn.) Howell. Miner's Lettuce.

Allison Pass.

Montia parvifolia (Dougl.) Howell. Miner's Lettuce.

Allison Pass. Roadside.

Ranunculaceae--Buttercup Family

Clematis ligusticifolia Nutt. Western Virgin's Bower.

"(J.M.M.) 1905."

Anemone occidentalis S. Wats. Tow-headed Baby.

Timberline Valley, mountain slopes.

Anemone globosa Nutt. Globose Anemone.

Lightning Lakes, Skagit Trail.

Anemone Lyallii Brit. Lyall's Anemone.

Allison Pass, on rockslide; Goodfellow Creek, on flat by river.

Anemone Drummondii Wats. Alpine Anemone.

"(J.M.M.) 1905."

Thalictrum occidentale Gray. Western Meadow Rue.

Timberline Valley, Allison Pass, Canam Mine,

Ranunculus Purshii Rich. Pursh's Buttercup.

Pinewoods, Goodfellow Creek, ponds and streams.

Ranunculus Eschscholtzii Schlect. Eschscholtz's Buttercup.

Timberline Valley. Canam Mine.

Ranunculus Bongardii Greene. Bongard's Buttercup.

Allison Pass, Skagit Valley. Woods.

Ranunculus Macounii Britt. Macoun's Buttercup.

Pinewoods, Canam Mine. On borders of swamp.

Ranunculus abortivus L. Small-flowered Buttercup.

Skagit Valley. Moist woods of poplar and birch.

Ranunculus reptans L. Creeping Spearwort.

"(J.M.M.) 1905."

Caltha leptosepala DC. Mountain Marsh-marigold.

Timberline Valley, Allison Pass. Common along mountain rills.

Trollius laxus Salisb. Globe Flower.

Allison Pass, Timberline Valley. Stream sides.

Aquilegia formosa Fisch. Columbine.

Timberline Valley, Pinewoods, Skagit Valley.

Actaea arguta Nutt. Western Baneberry.

Pinewoods, Goodfellow Creek. Both red-and white-berried forms. Woodland borders.

Delphinium bicolor Nutt. Flathead Larkspur.

Timberline Valley, west of Princeton.

Delphinium Menziesii DC. Menzies' Delphinium.

Skagit Trail, Allison Pass.

Aconitum columbianum Nutt. Monkshood.

Pinewoods (Dead Lake), Allison Pass, Lightning Lakes. Thickets near streams.

Berberidaceae--Barberry Family

Berberis repens Lindl. Creeping Barberry.

Pinewoods, Lightning Lakes. Dry slopes in open woods.

Berberis aquifolium Pursh. Oregon Grape.

Skagit Valley.

Berberis nervosa Pursh. Long-leaved Oregon Grape.

Skagit Valley. Woodlands.

Achyls triphylla DC.

"Common in Coquihalla Flats and Nicolum Valley."

Fumariaceae--Bleeding-Heart Family

Dicentra formosa DC. Bleeding Heart.

"Common in Sumallo Valley."

Cruciferae--Mustard Family

Lepidium virginicum L. var. medium (Greene) C.L. Hitchc.

Goodfellow Creek. Roadside by old camp.

Capsella bursa-pastoris (L.) Shepherd's Purse.

Goodfellow Creek. Roadside by old camp.

Smelowskia ovalis Jones. Alpine Smelowskia.

"(J.M.M.) 1905."

Camelina sativa Crantz. False Flax.

Pinewoods.

Rorippa palustris (L.) Bess.

Allison Pass. Marshy places.

Draba prealta Greene. Tall Whitlow-grass.

Pinewoods. Steep slopes near rock slides.

Draba stenoloba Ledeb. Slender Whitlow-grass.

Timberline Valley.

Draba oligosperma Hook. Few-seeded Whitlow-grass.

Timberline Valley.

Draba nivalis Liji. Alpine Whitlow-grass.

Timberline Valley.

Draba nivalis v. elongata Wats.

"(J.M.M.) 1905."

Cardamine oligosperma Nutt. Bitter-cress.

"Common in Sumallo and Nicolum Valleys."

Cardamine pennsylvanica Muhl. Pennsylvania Bitter-cress.

Timberline Valley, Lightning Lake.

Cardamine bellidifolia L. Alpine Bitter-cress.

"(J.M.M.) 1905."

Cardamine umbellata Greene. Umbel-flowered Bitter-cress.

"(J.M.M.) 1905."

Sisymbrium altissimum (L.) Britt. Tumble Mustard.

Goodfellow Creek. Roadside near old camp.

Arabis Holboellii Hornem. Holboell's Rock-cress.

Pinewoods, Allison Pass. Near Princeton. Gravelly flats and slopes.

Arabis glabra (L.) Bernh. Tower Mustard.

"(J.M.M.) 1905."

Arabis microphylla Nutt. Small-leaved Rock-cress.

Timberline Valley.

Arabis sparsiflora Nutt. Rock-cress.

Allison Pass, Timberline Valley.

Arabis Lyallii Wats. Lyall's Rock-cress.

"Hosameen Ridge."

Arabis Drummondii Gray. Drummond's Rock-cress.

"Canyon Valley."

Arabis pycnocarpa Hopkins as hirsuta. Hairy Rock-cress.

"(J.M.M.) 1905."

Arabis divaricarpa Nels. Spreading-pod Rock-cress.

"(J.M.M.) 1905."

Arabis lyrata L. var. kamchatica Fish. Western Rock-cress.

"(J.M.M.) 1905."

Droseraceae--Sundew Family

Drosera rotundifolia L. Sundew.

"Common on ridge between Mount Snass and Mount Hopeless."

Crassulaceae--Stonecrop Family

Sedum stenopetalum Pursh. Narrow-petaled Stonecrop.

Timberline Valley.

Sedum divergens Wats. Spreading Stonecrop.

Timberline Valley, Mile 20, Hope-Princeton Highway. Rocky slopes.

Saxifragaceae--Saxifrage Family

Ribes acerifolium Howell. Maple-leaved Currant.

Allison Pass, Pinewoods. Moist thickets.

Ribes cereum Dougl. Squaw Currant.

Eastern entrance of Park. Dry slopes.

Ribes montigenum McClatchie = lentum Cor. Rose. Mountain Gooseberry.

Pinewoods.

Ribes Hudsonianum v. petiolare Jancz. Western Black Currant.

Pinewoods.

Ribes irriguum Dougl. Inland Black Gooseberry.

Goodfellow Creek.

Ribes lacustre (Pers.) Poir. Prickly Currant.

Pinewoods. Allison Pass.

Ribes viscosissimum Pursh. Sticky Currant.

Skyline Trail, Allison Pass, Lightning Lake, Canam Mine.

Ribes divaricatum Dougl. Coast Black Gooseberry.

"Common in Upper Skagit."

Philadelphus Gordonianus Lindl. Mock Orange.

Northeast ridge near Whitworth Ranch.

Parnassia fimbriata Konig. Fringed Grass of Parnassus.

Allison Pass.

Mitella Breweri Gray. Brewer's Mitrewort.

Timberline Valley, Canam Mine.

Mitella pentandra Hook. Alpine Mitrewort.

On mossy banks of mountain rills.

Mitella trifida Graham. Three-toothed Mitrewort.

Pinewoods.

Tolmiea Menziesii Pursh. Youth-on-Age.

Mile 20, Hope-Princeton Highway. Stream sides.

Tellima grandiflora Dougl. Large Fringe-cup.

"Common in Sumallo Valley."

Tiarella unifoliata Hook. Sugar-scoop.

Allison Pass. Abundant in woods.

Tiarella trifoliata L. Laceflower.

Pinewoods. Woods.

Heuchera glabra Willd. Alpine Alum-root.

"Sumallo, near Twenty-one Mile House."

Heuchera ovalifolia T.G. Oval-leaved Alum-root.

Pinewoods.

Heuchera racemosa (S. Wats.) Rydb.

"(J.M.M.) 1905."

Heuchera micrantha Dougl. Small-flowered Alum-root.

"(J.M.M.) 1905."

Leptarrhena pyrolifolia (D. Don.) R. Br. Pear-leaf.

Timberline Valley. Forms dense mat-like growth near streams and on moist slopes. Common.

Hemieva ranunculifolia (Hook.) Raf. Buttercup-leaved Hemieva.

Skagit Valley, Skyline Trail. Rocky slopes where there is a constant trickle of water.

Saxifraga arguta D. Don. Brook Saxifrage.

Timberline Valley, Canam Mine. Mossy rills.

Saxifraga aestivalis Fisch. & Mey. Summer Saxifrage.

Timberline Valley, Canam Mine.

Saxifraga bronchialis var. *austromontana* (Wieg.) Piper.

Timberline Valley. Rock crevices.

Saxifraga ferruginea Graham (=*Bongardi*.) Alaska Saxifrage.

Timberline Valley, Canam Mine.

Saxifraga Mertensiana Bong. Wood Saxifrage.

Timberline Valley.

Saxifraga occidentalis Wats. Western Mountain Saxifrage.

Timberline Valley.

Saxifraga oppositifolia L. Purple Saxifrage.

Timberline Valley, Three Brothers Mountain.

Saxifraga Tolmiei T. & G. Tolmie's Saxifrage.

Timberline Valley, Three Brothers Mountain. Gravelly margin of snow pools.

Saxifraga rhomboidea Greene. Alpine Saxifrage.

Timberline Valley, Three Brothers Mountain.

Saxifraga Lyallii Engler. Red-stemmed Saxifrage.

"(J.M.M.) 1905."

Saxifraga adsendens v. *oregonensis* (Raf.) Baclpi. Wedge-leaved Saxifrage.

"(J.M.M.) 1905."

Saxifraga cernua L. Nodding Saxifrage.

"(J.M.M.) 1905."

Rosaceae--Rose Family

Prunus emarginatus (Dougl.) Walp. Wild Cherry.

Goodfellow Creek.

Prunus demissa (Nutt.) Walp. Western Choke Cherry.

"Upper Skaist."

Rubus pedatus Smith. Five-leaved Dwarf Bramble.

Timberline Valley. Lightning Lakes. Woodlands, where it trails over the moss covered ground.

Rubus lasiococcus Gray. Dwarf Bramble.

"Locally common near Mowitch Camp."

Rubus spectabilis Pursh. Salmonberry.

"Common in most of the valleys."

Rubus leucodermis Dougl. Western Blackcap.

Common in vicinity of rock-slides.

Rubus vitifolius C. & S. Western Dewberry.

"Common in Sumallo Valley."

Rubus parviflorus Nutt. Thimble Berry.

Pinewoods. More common west of the Divide.

Rubus melanolasius Focke. Western Red Raspberry.

Pinewoods.

Fragaria bracteata Heller. Wood Strawberry.

Lightning Lakes.

Fragaria platypetala Rydb. Broad-petaled Strawberry.

Pinewoods.

Rosa nutkana Presl. Nootka Rose.

Pinewoods. Lightning Lake, Goodfellow Creek. Creek banks.

Rosa gymnocarpa Nutt. Woodland Rose.

Pinewoods. Dry woods.

Physocarpus capitatus (Pursh.) Kuntze. Western Ninebark.

"Common at Coquihalla Flats."

Lutkea pectinata T. & G. Alpine Spiraea.

Timberline Valley. A common mountain plant where it forms extensive tracts on open slopes.

Spiraea discolor Pursh. Ocean Spray.

Pinewoods. Not common, probably about the easternmost extension of its range in the Park.

Spiraea lucida Dougl. Birch-leaved Spiraea.

Pinewoods. Abundant on the roadsides.

Spiraea pyramidata Greene.

Lightning Lake trail. Considered to be a cross between lucida and Menziesii both of which occur here.

Spiraea Menziesii Hook. Menzies' Spiraea.

Pinewoods. Goodfellow Creek. Swamps.

Spiraea densiflora Nutt. Mountain Spiraea.

"(J.M.M.) 1905."

Potentilla glandulosa (Lindl.) Stocky Cinquefoil.

Pinewoods.

Potentilla glandulosa var. *Wrangelliana* Fisch & Are-Lall.

"(J.M.M.) 1905."

Potentilla monspeliensis L. Rough Cinquefoil.

Pinewoods.

Potentilla flabellifolia Hook. Fringe-leaf Cinquefoil.

Timberline Valley.

Potentilla gracilis Dougl. Slender Cinquefoil.

Pinewoods. Goodfellow Creek.

Potentilla Nuttallii Lehm. (Close to *gracilis*.) Nuttall's Cinquefoil.

Allison Pass.

Potentilla fruticosa L. Shrubby Cinquefoil.

Timberline Valley.

Potentilla diversifolia Lehm. Mountain Meadow Cinquefoil.

Timberline Valley.

Potentilla Drummondii Lehm. Drummond's Cinquefoil.

"Hope Trail."

Potentilla palustris (L.) Scop. Marsh Cinquefoil.

"(J.M.M.) 1905."

Aruncus sylvester Kost. Goat's Beard.

"Common along Nicolum Valley."

Dryas octopetala L. White Mountain Avens.

"(J.M.M.) 1905."

Geum macrophyllum Willd. Large-leaved Yellow Avens.

Pinewoods.

Sibbaldia procumbens L. Sibbaldia.

Timberline Valley. Among rocks at the higher levels.

Crataegus Douglasii Lindl. Black Hawthorn.

"(J.M.M.) 1905."

Malus fusca (Raf.) Scheid. Crab Apple.

"Near Beaver Lake and Lower Sumallo."

Sorbus occidentalis (S. Wats.) Greene. Western Mountain Ash.

Timberline Valley.

Sorbus sitchensis M. Roem. Sitka Mountain Ash.

Allison Pass. Lightning Lake.

Amelanchier florida Lindl. Juneberry.

Pinewoods. Lightning Lake, Allison Pass, and on the roadsides towards Princeton.

Leguminosae--Pea Family

Hosackia denticulata Drew. Toothed Bird-foot Clover.

Skagit Valley.

Lupinus latifolius canadensis C.P. Smith. Lupine.

Timberline Valley, Goodfellow Creek, Skagit Valley.

Lupinus lepidus ssp. *Lyallii* (Gray) Detling. Lyall's Lupin.

Timberline Valley. This is characteristic of the more arid sections of the west coast mountains.

Lupinus sericeus Pursh. Silky Lupine.

West of Princeton.

Astragalus serotinus A. Gray. Late Milk-vetch.

West of Princeton.

Astragalus Macounii Rydb. Milk Vetch.

Goodfellow Creek.

Vicia americana v. *truncata* (Nutt.) Brewer. American Vetch.

Skagit Valley.

Lathyrus Nuttallii Wats. Purple Pea.

Pinewoods, Skagit Valley.

Geraniaceae--Geranium Family

Geranium viscosissimum F. & M. Sticky Geranium.

Pinewoods.

Celastraceae--Stafftree Family

Pachystima myrsinites Raf. False Box.

Pinewoods. A characteristic undergrowth in the open *Pinus contorta* forests, where it forms monospecific stands.

Aceraceae--Maple Family

Acer glabrum var. Douglasii (Hook.) Dipp. Douglas Maple.

Pinewoods, Lightning Lakes.

Acer circinatum Pursh. Vine Maple.

Skagit Valley. Common on the western slopes near Hope.

Rhamnaceae--Buckthorn Family

Ceanothus velutinus Dougl. Sticky Snowbrush.

Pinewoods, Skagit Valley.

Ceanothus sanguineus Pursh. Buckbrush, Wild Lilac.

Skagit Valley.

Hypericaceae- St. John's Wort Family

Hypericum perforatum L. Common St. John's Wort.

Along roadsides near Hope. Adventive from Europe.

Violaceae--Violet Family

Viola palustris L. Marsh Violet.

Pinewoods, Allison Pass.

Viola glabella Nutt. Smooth Yellow Violet.

Canam Mine. 6,000 feet.

Viola rugulosa Greene. Yellow-eyed Violet.

Allison Pass.

Viola orbiculata Geyer. Round-leaved Violet.

Timberline Valley. Pinewoods.

Viola adunca Smith. Western Long-spurred Violet.

Timberline Valley. Pinewoods. Goodfellow Creek. Shady banks.

Elaeagnaceae--Oleaster Family

Shepherdia canadensis (L.) Nels. Soapolallie.

Pinewoods.

Onagraceae--Evening-Primrose Family

Circaea pacifica Arch. Enchanter's Nightshade.

Skagit Valley.

Epilobium angustifolium L. Fire-weed.

Common everywhere.

Epilobium latifolium L. Broad-leaved Fire-weed.

Allison Pass. A mountain species.

Epilobium glandulosum var. adenocaulon (Haus.) Fern. Common Willow Herb.

Goodfellow Creek. Lightning Lake. Pinewoods.

Epilobium minutum Lindl. Small-flowered Willow Herb.

Goodfellow Creek. Skagit Valley.

Epilobium anagallidifolium Lam. Alpine Willow Herb.

Allison Pass.

Epilobium luteum Pursh. Yellow-flowered Willow-herb.

Allison Pass. Banks of streams.

Epilobium platyphyllum Rydb.

Lightning Lake.

Epilobium Hornemanii Reich. Hormann's Willow Herb.

"Canyon Valley."

Epilobium paniculatum Nutt.

"(J.M.M.) 1905."

Epilobium oregonense Haus. Oregon Willow Herb.

"(J.M.M.) 1905."

Umbelliferae--Parsley Family

Sanicula graveolens Poepp. Sierra Sanicle.

Skyline Trail, Skagit Valley.

Osmorhiza chilensis Hook & Arn. Mountain Sweet Cicely.

Skagit Valley, Allison Pass, Goodfellow Creek, Pinewoods, Timberline Valley.

Osmorhiza purpurea (C.&.R) Suksd. Sweet Cicely.

"(J.M.M.) 1905."

Osmorhiza occidentalis Torr. Mountain Sweet Cicely.

Allison Pass, Pinewoods, Lightning Lake, Skyline Trail.

Leptotaenia dissecta Nutt. Lace-leaved Leptotaenia.

Skyline Trail.

Lomatium ambiguum (Nutt.) (C.&.R.) Swale Desert Parsley.

Allison Pass. Lightning Lake. Skyline Trail.

Lomatium Geyeri (S. Wats.) C.& R. White-flowered Desert Parsley.

Skyline Trail.

Lomatium nudicaule (Pursh.) C.& R. Indian Consumption Plant.

"Cambie Valley."

Lomatium macrocarpum (Nutt.) C. & R. Grey Desert Parsley.

West of Princeton.

Heracleum lanatum Mich. Cow Parsnip.

Everywhere, up to timberline.

Cicuta Douglasii (DC.) C. & R. Poison Hemlock.

Pinewoods. Border of streams and damp places.

Araliaceae--Ginseng Family

Echinopanax horridum Dec. & Planch. Devil's Club.

Hemlock woods west of Allison Pass.

Cornaceae--Dogwood Family

Cornus canadensis L. var. intermedia Farr. Bunchberry.

Lightning Lake.

Cornus Nuttallii T. & G. Flowering Dogwood.

Skagit Valley.

Cornus pubescens Nutt. Western Red Dogwood.

Abundant on stream sides where it often forms impenetrable thickets.

Cornus stolonifera Michx. Red-osier Dogwood.

"(J.M.M.) 1905."

Ericaceae--Heath Family

Vaccinium oxycoccus var. intermedium Gray. Cranberry.

"(J.M.M.) 1905."

Vaccinium ovalifolium Smith. Tall Blue Huckleberry.

Lightning Lake, Allison Pass. The most abundant huckleberry at the 4,000-foot level.

Vaccinium membranaceum Dougl. Mountain Huckleberry.

Skyline Trail, Pinewoods, Timberline Valley.

Vaccinium scoparium Leiberg. Red Alpine Huckleberry.

Pinewoods, Timberline Valley, Goodfellow Creek, Skyline Trail. Often forms extensive tracts in open woods at the higher levels.

Vaccinium parvifolium Smith.

In most of the valleys.

Vaccinium caespitosum Michx. Dwarf Huckleberry.

Pinewoods, Goodfellow Creek, Timberline Valley, Skyline Trail.

Vaccinium deliciosum Piper. Blue-leaved Huckleberry.

Timberline Valley. Common at higher levels.

Pyrola secunda L. One-sided Wintergreen.

Allison Pass, Skagit Valley.

Pyrola minor L. Lesser Wintergreen.

Allison Pass, Skagit Valley.

Pyrola picta Smith. White-veined Wintergreen.

Skagit Valley. Hope-Princeton Highway.

Pyrola chlorantha Swartz. Greenish Wintergreen.

"Common in Upper Skagit."

Pyrola bracteata Hook. Large Wintergreen.

Skagit Valley.

Pyrola asarifolia Michx. Bitter-leaved Wintergreen.

Pinewoods. Allison Pass. Skagit Valley.

Moneses uniflora (L.) Gray. Single Delight.

Lightning Lakes. Allison Pass. On mossy ground in woods.

Chimaphila umbellata (L.) Nutt. Prince's Pine.

Pinewoods.

Ledum groenlandicum Oeder. Labrador Tea.

Pinewoods.

Ledum glandulosum Nutt. Mountain Labrador Tea.

Pinewoods. This species and Ledum groenlandicum were growing together near the Similkameen River below Pinewoods.

Arctostaphylos uva-ursi Spreng. Bear-berry.

Pinewoods.

Gaultheria humifusa (Grah.) Rydb. Mountain Teaberry.

Timberline Valley.

Gaultheria shallon Pursh. Salal.

Common in most of the valleys.

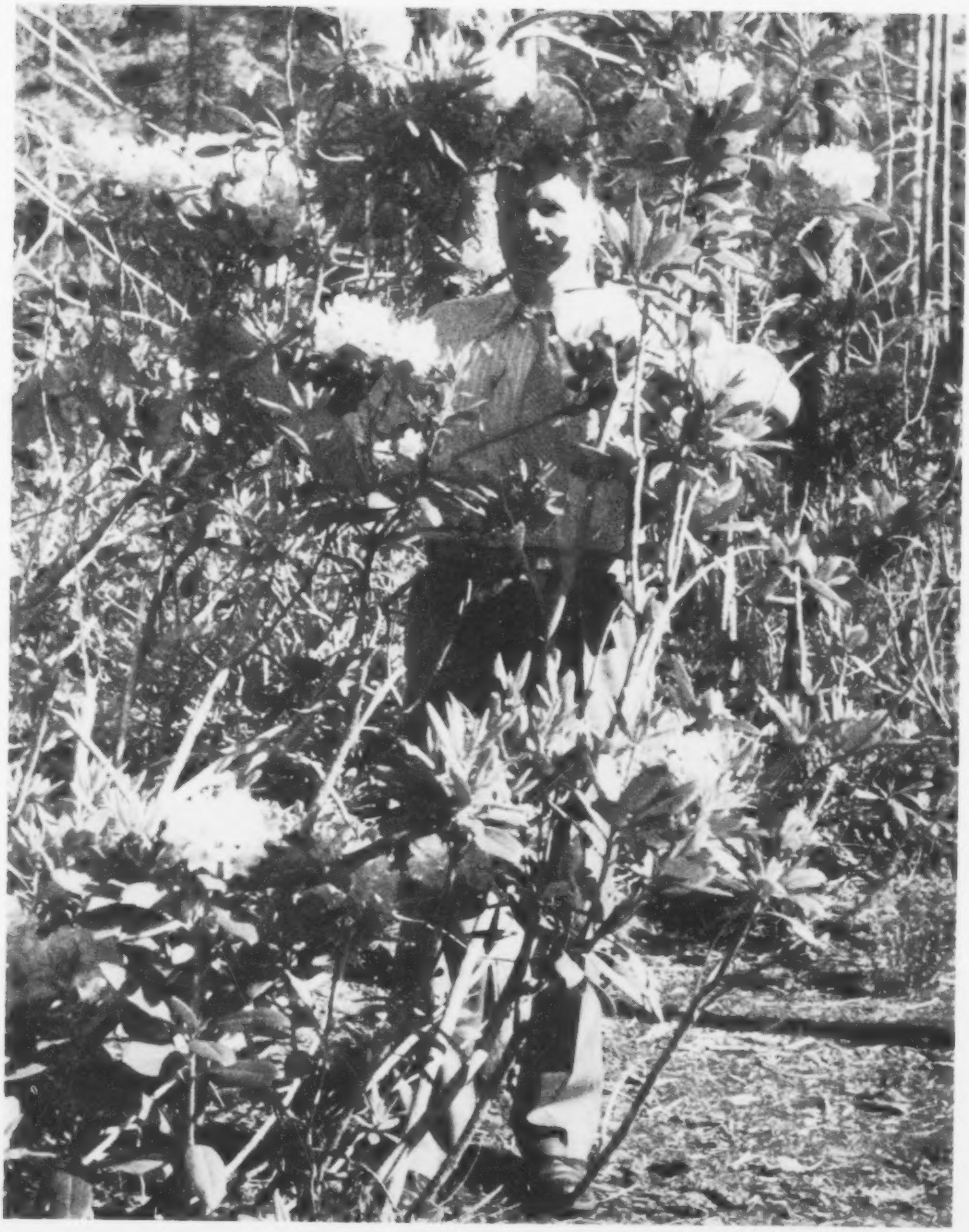

Fig. 12. California Rhododendron, near Mile 22, Hope-Princeton Highway.

(Photo by British Columbia Forest Service.)

Gaultheria ovatifolia Gray. Western Teaberry.

"Upper Skagit Valley."

Cassiope Mertensiana Don. Moss Heather.

Timberline Valley, "North side of Lightning Valley."

Phyllodoce empetriformis Don. Red False Heather.

Timberline Valley, Allison Pass.

Phyllodoce glanduliflora (Hook.) Cov. White False Heather.

Timberline Valley, Allison Pass.

Kalmia microphylla (Hook.) Hiller. Swamp Laurel.

Timberline Valley. Marshy flats, among moss.

Menziesia ferruginea Smith. False Azalea.

Pinewoods, Allison Pass, Skagit Valley.

Rhododendron californicum Hook. California Rhododrendon.

Mile 22, Hope-Princeton Highway; Skagit Valley; Lightning Lake. One of the finest flowering shrubs in the Park, and protected by law from wanton destruction. This is the near northern limit. Elsewhere in British Columbia, a small colony on Vancouver Island is known.

Rhododendron albiflorum Hook. White Rhododendron.

Pinewoods, Allison Pass.

Moneses uniflora L. Indian Pipe.

Northeastern slopes of Mount Snass.

Primulaceae--Primrose Family

Androsace subumbellata (Nels.) Small. Small Mountain Androsace.

Timberline Valley.

Trientalis latifolia Hook. Star Flower.

"Sumallo Valley, etc."

Trientalis arctica Fisch. Northern Star Flower.

"Divide between Mount Snaas and Mount Hopeless."

Dodecatheon Cusickii Greene. Sticky Shooting Star.

West of Princeton.

Gentianaceae--Gentian Family

Gentiana acuta Michx. Northern Gentian.

Timberline Valley.

Gentiana glauca Pall. Glaucous Gentian.

Timberline Valley.

Menyanthes trifoliata L. Buckbean.

"(J.M.M.) 1905."

Apocynaceae--Dogbane Family

Apocynum androsaemifolium L. Dogbane.

Pinewoods. Dense growth on gravelly bank of road.

Polemoniaceae--Phlox Family

Gilia linearis Gray. Narrow-leaved Gilia.

Pinewoods, Goodfellow Creek.

Gilia aggregata Spreng. Scarlet Gilia.

Pinewoods, eastern Park entrance. (C.P. Lyons.)

Gilia gracilis (Dougl.) Hook. Pink Gilia.

Northern slopes of Lightning Creek.

Polemonium pulcherrimum Hook. Showy Polemoni.

Pinewoods, Timberline Valley, Lightning Lake.

Phlox diffusa Benth. Phlox.

Timberline Valley, Lightning Ridge.

Hydrophyllaceae--Water-leaf Family

Romanzoffia sitchensis Bong. Mist Maidens.

Hope-Princeton Highway, Mile 20. By side of stream.

Hydrophyllum capitatum Dougl. Dwarf Waterleaf.

Skagit Trail. West of Princeton.

Hydrophyllum Fendleri (A. Gray) Heller. Fendler Waterleaf.

Timberline Valley, Skagit Trail, Canam Mine.

Phacelia leucophylla Torr. White-leaved Phacelia.

Pinewoods, Allison Pass, Mile 20. Roadside and gravel banks.

Phacelia sericea Gray. Gray phacelia.

Timberline Valley.

Phacelia heterophylla Pursh. Varied-leaved Phacelia.

Common in Sumallo Valley and elsewhere.

Boraginaceae--Borage Family

Lappula diffusa (Lehm.) Greene. Stick-seed.

Common on northern slopes of Lightning Valley.

Myosotis laxa Lehm. Water Forget-me-not.

"(J.M.M.) 1905."

Mertensia oblongifolia Don. Lungwort.

Lightning Ridge.

Lithospermum pilosum Nutt. Puccoon.

West of Princeton.

Labiata--Mint Family

Prunella vulgaris L. Self-heal.

Common along the trails.

Galeopsis Tetrahit L. Hemp-nettle.

Mile 20, Hope-Princeton Highway. An European plant.

Mentha canadensis var. glabrata (Benth.) Fern. Canada Mint.

Skagit Valley.

Scrophulariaceae--Figwort Family

Verbascum Thapsus L. Mullein.

Goodfellow Creek. Along dry roadside by old campsite. European.

Collinsia parviflora Dougl. Blue-eyed Mary.

Allison Pass. Skagit Valley. Dry banks and slopes.

Pentstemon Menziesii Hook. Menzies' Pentstemon.

Timberline Valley, Skagit Trail.

Pentstemon Scouleri Dougl. Scouler's Pentstemon.

Pinewoods.

Pentstemon fruticosus (Pursh.) Greene. Shrubby Pentstemon.

Allison Pass.

Pentstemon confertus Dougl. Yellow Pentstemon.

"Upper Skaist."

Pentstemon procerus Dougl. Tall Pentstemon.

Timberline Valley, Allison Pass, Lightning Lake.

Pentstemon diffusus Dougl. Spreading Pentstemon.

Allison Pass, Goodfellow Creek. Forming conspicuous beds of massed flowers, steep rock shelves, and terraces.

Pentstemon ovatus Dougl. Broad-leaved Pentstemon.

West slope Lightning Ridge near Lone Goat Mountain.

Veronica alpina L. Alpine Speedwell.

Timberline Valley, Allison Pass. Thickly dotting the open mountain slopes with its dark blue flowers.

Veronica peregrina L. Neckweed.

Skagit Valley. Introduced from Europe.

Veronica serpyllifolia L. Thyme-leaved Speedwell.

Skagit Valley.

Veronica americana Sch. Brooklime.

Skagit Valley. Moist places by streams amd swamps.

Mimulus Lewisii Pursh. Red Monkey Flower.

Allison Pass, showy groups on banks of small streams. Mile 20, Hope-Princeton Highway.

Mimulus Moschatus Dougl. Musk Flower.

Allison Pass, ditch sides.

Mimulus alpinus (Gray.) Piper. Alpine Monkey Flower.

Timberline Valley. Forming brilliantly yellow patches among the melting snows.

Mimulus guttatus DC. Common Monkey Flower.

Plentiful along stream sides where it often grows in profusion.

Castilleja angustifolia (Nutt.) G. Don. and var. *bradburyi* Fern. Paint-brush.

Allison Pass. Common on flats by stream.

Castilleja lancefolia Rydb. Lance-leaved Paint-brush.

Lightning Lakes.

Castilleja Henryae Penn. Henry's Paint-brush.

Timberline Valley. Previously recorded only from Peace River area. Identified by Dr. L. Kelso.

Castilleja miniata Dougl. Common Paint-brush.

Pinewoods. Allison Pass. Hope-Princeton road. Abundant.

Castilleja pallescens (Nutt.) Greene. Pallid Paint-brush.

Timberline Valley.

Castilleja Elmeri Fern. Paint-brush.

Timberline Valley, Skagit Trail.

Castilleja pinetorum Fern. Red Paint-brush.

Timberline Valley.

Castilleja Suksdorfii Gray. Suksdorf's Paint-brush.

Pinewoods, Allison Pass.

Castilleja remota Greene.

Skagit Valley.

Melampyrum lineare Lam. Cow Wheat.

Goodfellow Creek. Dry open woods.

Pedicularis bracteosa Benth. Bracted Lousewort.

Timberline Valley.

Pedicularis groenlandica Retz. Little Elephant.

Timberline Valley. Frequent on moist flats by mountain rills.

Pedicularis racemosa Hook. Leafy Lousewort.

Pinewoods, Timberline Valley, Allison Pass.

Orobanchaceae--Broom-Rape Family

Orobanche uniflora L. One-flowered Cancer-root.

Skagit Trail. Parasitic on stonecrop & Lomatium.

Lentibulaceae--Bladderwort Family

Pinguicula vulgaris L. Butterwort.

"On summit of ridge between Mount Snaas and Mount Hopeless."

Rubiaceae--Madder Family

Galium trifidum L. Bedstraw.

Pinewoods, Goodfellow Creek.

Galium triflorum Michx. Sweet-scented Bedstraw.

Pinewoods, eastern entrance to Park.

Caprifoliaceae--Honeysuckle Family

Linnaea borealis var. americana (Forbes) Rehdr. Twinflower.

Pinewoods, Mile 20, Hope-Princeton Highway. Occasionally in extensive patches that give out a very fragrant perfume.

Lonicera ciliosa (Pursh.) Poir. Orange Honeysuckle.

Skagit Valley.

Lonicera involucrata Banks. Black Twin-berry.

Skagit Valley, Pinewoods. Moist places.

Lonicera utahensis Wat. Red Twin-berry.

Pinewoods, Lightning Lakes. Reaches its western limit here.

Symphoricarpos racemosa Michx. Wax berry.

Skagit Valley. Dry slopes.

Sambucus callicarpa Greene. Red Elderberry.

Skagit Valley. Frequent in moist ground where it grows in dense thickets of alder and dogwood.

Valerianaceae--Valerian Family

Valeriana sitchensis Bong. Valerian.

Timberline Valley. The large white umbels form a feature of the mountain floral landscape.

Campanulaceae--Bluebell Family

Campanula rotundifolia L. Bluebell.

Eastern entrance to Park. "Sumallo, near Beaver Lake."

Compositae--Daisy Family

Brickellia oblongifolia Nutt. Thoroughwort.

"(J.M.M.) 1905."

Aster conspicuous Lindl. Showy Aster.

Goodfellow Creek.

Aster foliaceus apricus Rydb. Leafy Aster.

Pinewoods, Allison Pass. An obvious and showy plant on roadside and field borders.

Aster modestus Lindl. Sticky Aster.

Hope-Princeton Highway. Occasional in low thickets.

Eucephalus Englemannii Gray. Englemann's Aster.

Pinewoods, Allison Pass, Timberline Valley, Lightning Lake. Sometimes noticeably associated with wild lilac (Ceanothus.)

Erigeron acris L. and var. debilis Gray. Bitter Erigeron.

Pinewoods, Allison Pass, Timberline Valley, Canam Mine. Very variable in stature according to habitat.

Erigeron compositus Pursh. Dwarf Mountain Fleabane.

Timberline Valley, Three Brothers Mountain, Pinewoods, Skagit Trail. Usually in rock crevices or gravelly benches.

Erigeron aureus Greene. Golden Fleabane.

Timberline Valley, Three Brothers Mountain, Canam Mine. One of the brightest mountain flowers, where it grows on open slopes with Veronica alpina to form a rich contrast in yellow and blue.

Erigeron uniflorus L. Arctic Erigeron.

Timberline Valley.

Erigeron yellowstonensis A. Nels.

Lightning Lake.

Erigeron salsuginosus (Rich.) Gray. Aster Erigeron.

Timberline Valley, Three Brothers Mountain. One of the most abundant alpine flowers.

Erigeron philadelphicus L. Fleabane.

Mile 15, Hope-Princeton Highway, Lightning Lake.

Erigeron speciosus DC. Showy Erigeron.

"(J.M.M.) 1905."

Erigeron macranthus. Large-flowered Erigeron.

Goodfellow Creek.

Aplopappus Lyallii Gray. Lyall's Aplopappus.

Timberline Valley, Canam Mine. Rock crevices at highest altitudes.

Solidago algida Piper. Northern Goldenrod.

Timberline Valley, Allison Pass. A small alpine species.

Solidago lepida var. elongata (Nutt.) Fern. Narrow Goldenrod.

"(J.M.M.) 1905."

Solidago decumbens Green. Decumbent Goldenrod.

Pinewoods.

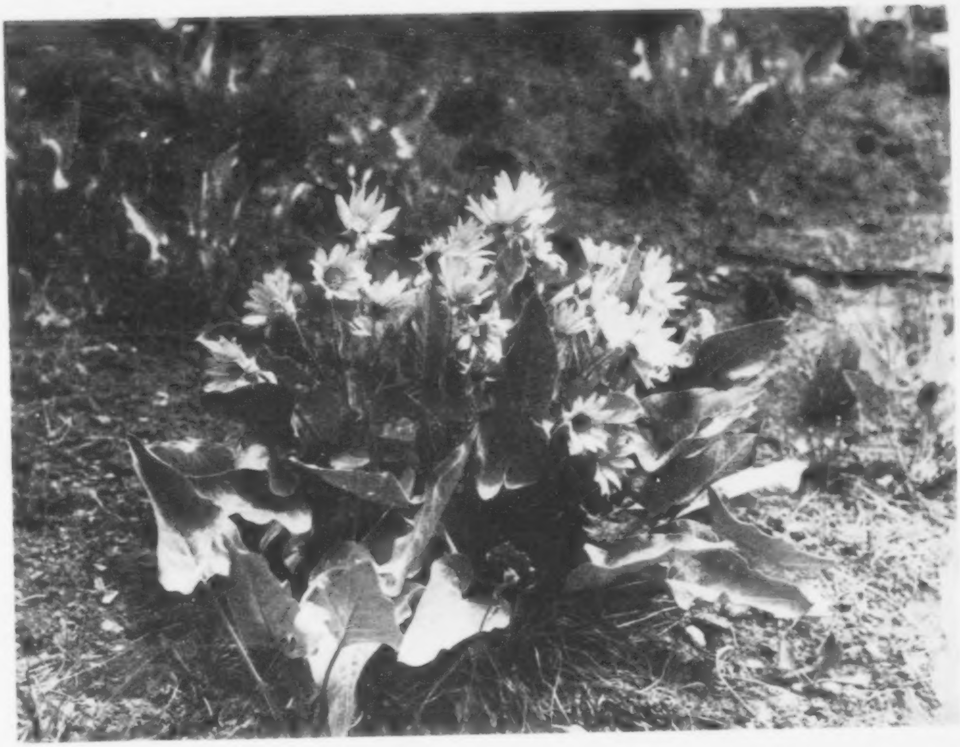

Fig. 13. Balsam root, a typical dry-belt plant.

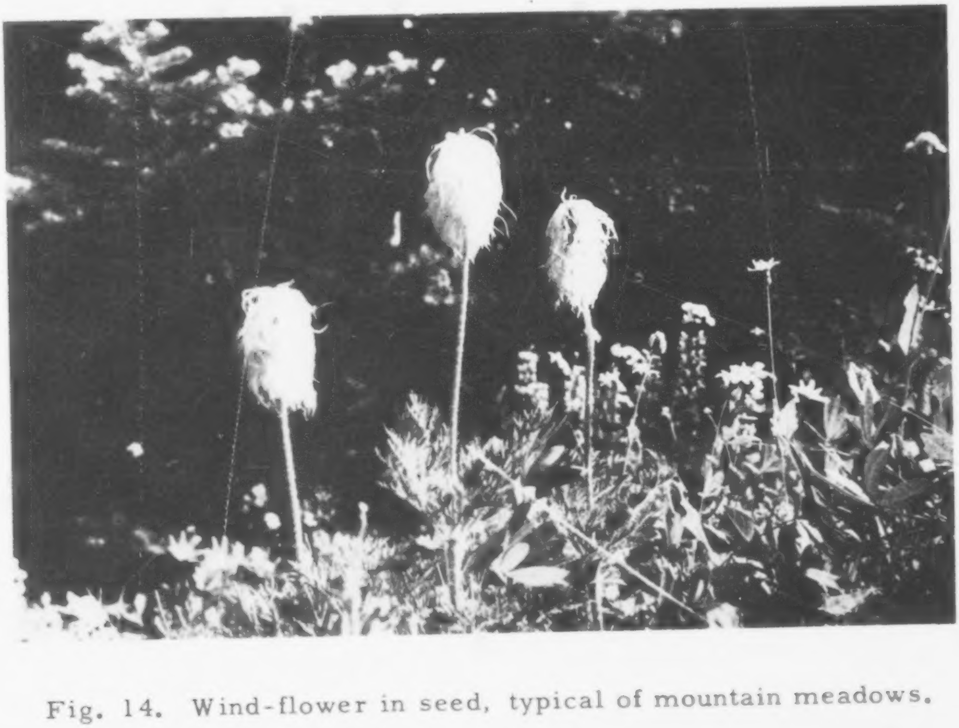

Fig. 14. Wind-flower in seed, typical of mountain meadows.

Balsamorhiza sagittata Nutt. Balsam-root.

Windy Joe Mountain and Lightning Ridge, near Skagit Valley. Common at eastern approaches to the Park, near Princeton, where it is associated with the yellow pine and sagebrush; flowering in June.

Eriophyllum lanatum (Pursh.) Forbes. Woolly Sunflower.

"Upper Sumallo and near Mount Hosameen."

Achillea millifolium L. Yarrow.

Allison Pass. Common at all levels.

Artemisia discolor Dougl. Green Wormwood.

Pinewoods, Skagit Trail.

Artemisia Absinthium L. Wormwood.

Goodfellow Creek. Roadsides.

Artemisia tridentata Nutt. Sagebrush.

West of Princeton.

Artemisia tridentata var. trifida (Nutt.) Peck.

Eastern entrance to Park.

Petasites speciosus (Nutt.) Piper. Colt's Foot.

Goodfellow Creek. Along stream sides.

Petasites frigida (L.) Fries. Colt's Foot.

Timberline Valley. Borders of mountain rivulets.

Arnica Parryi Gray. Parry's Arnica.

Pinewoods, Allison Pass, Timberline Valley.

Arnica cordifolia Hook. Heart-leaved Arnica.

Pinewoods, Lightning Lakes, Allison Pass, Skagit Trail. A woodland plant.

Arnica latifolia Bong. Broad-leaved Arnica.

Timberline Valley, Allison Pass, Pinewoods.

Arnica fulgens Pursh. Shining Arnica.

Timberline Valley.

Arnica amplexicaulis Nutt. Clasping Arnica.

Pinewoods, Allison Pass, Timberline Valley.

Arnica alpina (L.) Olm. Alpine Arnica.

Timberline Valley.

Senecio pauciflorus Pursh. Few-flowered Senecio.

Timberline Valley, Allison Pass.

Senecio triangularis Hook. Spear-head Senecio.

Timberline Valley. Forms thick group on bank of stream sides and rills.

Senecio exaltatus Nutt. Tall Senecio.

Skagit Trail.

Senecio cymbalarioides Nutt. Pale Groundsel.

Pinewoods. Allison Pass.

Senecio pseudaureus Rydb. Orange Senecio.

Pinewoods. Lightning Lakes.

Senecio canus Hook. Gray Senecio.

Windy Joe. One of the arid-land types which here finds its western limit.

Senecio Fremonti. T. & G. Fremont's Senecio.

"(J.M.M.) 1905."

Luina hypoleuca Benth. Silver-back.

Canam Mine, Allison Pass. A coastal mountain species that comes near its eastern range in the Park.

Antennaria Howellii Greene. Howell's Everlasting.

Skagit Valley. Gravelly flats.

Antennaria stenolepis Greene. Narrow Everlasting.

Skagit Valley. Gravelly places.

Antennaria chlorantha Greene. Green Everlasting.

Timberline Valley.

Antennaria media Greene. Alpine Everlasting.

Timberline Valley.

Antennaria racemosa Hook. Slender Everlasting.

Pinewoods. Lightning Lakes. Allison Pass. Skagit Trail.

Antennaria umbrinella Rydb. Pale Everlasting.

West of Princeton.

Antennaria lanata Greene. Woolly Everlasting.

Timberline Valley. Skagit Trail. Among rocks.

Antennaria parvifolia Nutt. Small-leaved Everlasting.

Pinewoods. Timberline Valley.

Antennaria rosea Greene.

Pinewoods. Timberline Valley. Allison Pass. Lightning Lakes.

Anaphalis margaritacea Benth. Pearly Everlasting.

Pinewoods. Allison Pass. Roadsides and dry lands.

Gnaphalium Macounii Greene. Macoun's Cudweed.

"(J.M.M.) 1905."

Cirsium lanceolatum L. Common Thistle.

Allison Pass. Goodfellow Creek, roadside.

Cirsium arvense L. Canada Thistle.

Goodfellow Creek, roadside.

Cirsium edule Gray. Edible Thistle.

Common in sub-alpine regions in most of the valleys.

Agoseris grandiflora (Nutt.) Greene. Large-flowered Agoseris.

Pinewoods.

Agoseris aurantiaca (Hook.) Greene. Golden Agoseris.

Pinewoods. Windy Joe.

Agoseris gracilens (A. Gray) Kuntze. Slender Agoseris.

Allison Pass.

Agoseris carnea Rydb. Pink Agoseris.

Timberline Valley.

Agoseris laciniata (Nutt.) Greene. Cut-leaved Agoseris.

Allison Pass.

Agoseris glauca (Nutt.) Greene. Pale Agoseris.

"(J.M.M.) 1905."

Crepis atribarba Heller. Slender Hawk's Beard.

Skagit Valley.

Crepis intermedia Gray. Hawk's Beard.

West of Princeton.

Hieracium gracile Hook. Alpine Hawkweed.

Timberline Valley, Allison Pass.

Hieracium scabriusculum Schw. Rough Hawkweed.

Pinewoods.

Hieracium albiflorum Hook. White-flowered Hawkweed.

Skagit Valley, woods.

Hieracium cynoglossoides Arv-Touv. Houndstongue Hawkweed.

Pinewoods, Allison Pass, Lightning Lakes.

MAMMALS

It is not the usual practice of this institution to indicate geographic races where no specimens have been taken and examined, consequently the appearance of trinomials in the text may be a surprise to some. Before criticism is levelled however, we hasten to explain that the races are indicated here at the specific request of many students, foresters, and other workers having an interest in the speciation of mammals in this area.

Many of the mammals have been identified on the basis of specimen records by Dr. I. McTaggart Cowan of the University of British Columbia and C.J. Guiguet of the Provincial Museum; where no specimens were available the races likely to occur have been postulated following Anderson (1946).

SHREW MOLE Neurotrichus gibbsii (Baird)

This interesting mammal was found in the meadows at Mile 12 and under shrubbery along the stream at Mile 17 on the Hope-Princeton Highway. Specimens were also taken near the Skagit River about 5 miles north of the International Boundary. The easternmost records were taken by J. A. Munro at Mile $42\frac{1}{2}$ where three specimens were collected.

The race occurring in British Columbia is N. g. gibbsii (Baird).

CINEREUS SHREW *Sorex cinereus* Kerr

Two specimens taken at the Ranger Station were of distinct races. One was of the western race *S. c. streatori* Merriam, and the other *S. c. cinereus* Kerr of the interior. This small sample seems to indicate a definite zone of intergradation in Manning Park.

DUSKY SHREW *Sorex obscurus* Merriam

Specimens collected at Allison Pass also represented two geographic races, *S. o. obscurus* Merriam of the interior, *S. o. setosus* Elliot of the west, indicating intergradation in the Park area.

WATER SHREW *Sorex palustris* Richardson

The water shrew occurs throughout the Park area. Although nocturnal in habit they are sometimes seen foraging by day, resembling a silver bubble as they swim beneath the surface in search of caddis fly larvae and small fishes.

Specimens collected in Manning Park along the roadside ponds and streams were of the race *S. p. navigator* (Baird).

LITTLE BROWN BAT *Myotis* species

According to R. M. Anderson (1946) the ranges of several species encompass or encroach upon the area under discussion. These, to the subspecific level, are as follows: *Myotis lucifugus lucifugus*; *Myotis lucifugus alascensis*; *Myotis lucifugus saturatus*; *Myotis evotis pacificus*; *Myotis yumenensis saturatus*; *Myotis yumenensis sociabilis*; *Myotis volans longicurus*; *Myotis californicus californicus*; *Myotis californicus caurinus*. Two specimens collected, at Mile 17 and Mile 23, proved to be *Myotis yumenensis saturatus* Miller.

It seems obvious that a great deal of collecting and study is required to clarify the status of this group of mammals in the area.

SILVER-HAIRED BAT Lasionycteris noctivagans (Le Conte)

This high-feeding species appears earlier in the evening than does the little brown bat. It has a slower wing beat and may be observed in the early evening along the highway at almost any point. Specimens were collected by all museum field parties that visited the area.

BIG BROWN BAT Eptesicus fuscus (Beauvois)

This appears to be the most common bat in the area--or possibly it is the most easily shot, flying more slowly than the little browns and often lower than the silver-haired bats. Specimens collected by the Provincial Museum parties were of the race E. f. bernardinus Rhoads. A paler form, E. f. pallidus (Young), occurs from southeastern to central British Columbia and it is possible that intergrades may occur in the eastern Park area.

LUMP-NOSED BAT Corynorhinus rafinesquii (Lesson)

Although no specimens were taken or positively identified in flight, it is highly probable that this species occurs. Two races may intergrade in the Park area, C. r. pallescens (Miller) of the interior and C. r. townsendii (Cooper) of the coastal region.

RACCOON Procyon lotor (Linnaeus)

There is, as yet, no record of this animal in Manning Park.

BLACK BEAR Euarctos americanus Pallas

Black bears were encountered on several occasions by field collectors and are constantly reported in the area. Sign was observed in the rock slides and alpine meadows of the high country. Edwards found them concentrating on the moist areas of the river bottoms in the summer time.

With regard to their diet within the Park Edwards (1949) reports as follows:

"At first the bears seem to range the high, open slopes, which early clear of snow, there feeding almost entirely upon grasses. Later, in the moist areas in the bottomlands, they continue to eat grasses, and also quantities of the early-appearing and fast-growing horsetail (Equisetum spp.). By late June, ants are forming a major portion of the diet. The summer's vegetation is by this time well advanced and offering a succession of fruits and other items.

"Most berry-producing plant species had a poor fruit crop in 1949, so little first-hand information was gathered regarding their importance.

"In a number of places, ant-riddled logs, ripped open by bears, were fairly numerous. These usually occurred in open sites, as the large Gibson Pass burn, and the narrow strip of open alplands topping the Skyline ridge.

"While the food of bears is predominantly vegetable, meat is eaten when obtainable. In late May (1949) a deer was killed by a car on the highway, and was subsequently fed upon by a bear. This is the only evidence obtained of meat in the diet of bears.

"Throughout the summer rough examinations were made of forty-one scats. Most of these were found before mid-July. Those found after that date were in open, dry locations where ground vegetation did not hide them. Because these examinations were rough, items are presented as those predominant in the scat, and not necessarily as the entire contents (See Table I)."

Table I

Major Contents of forty-one Bear Scats

Item	No. Occurrences	% Occurrence
grass	29	71
Equisetum	12	30
ants	5	12
Deciduous leaves	1	2.5
Liliacae (whole plant)	1	2.5
seeds (Shepherdia)	1	2.5
wood	1	2.5
tin can label	1	2.5
cellophane	1	2.5
$\frac{1}{4}$" rubber tubing	1	2.5

Both black and brown colour phases are present with black predominating which indicates intergradation of E. a. americanus Pallas and E. a. cinnamon (Audubon and Bachman) in the area.

GRIZZLY BEAR Ursus horribilis Ord.

Grizzly bear occur in the Park area. Tracks and droppings were observed by the Provincial Museum party at the Canam Mine site in 1949 and authentic reports from the western areas are on record. Photographs of grizzly bear, killed at the "Canyon" of the Snass river, and reports of several others observed there, were furnished by prospector Bill Robinson, who lives near Mile 21 and has worked in the area since 1911. Mr. Robinson believes that grizzlies are more numerous than general opinion holds. In view of the secretiveness and timidity of these animals this belief may be entirely correct. Bruce McDiarmid, E. G. Oldham, J. Lewis, and S. Smith have all observed grizzlies or grizzly signs in the Park area, especially to the westward. The few records from the more populated eastern side probably indicate wandering animals.

RED FOX Vulpes fulva (Desmarest)

The fox is not common in the Park although Mr. Hilton has seen it occasionally in the Similkameen Valley, from Copper Creek almost to Allison Pass. A few have been trapped; one in the silver colour phase, was taken at Hanson Creek.

The geographic race occurring here is V.f. cascadensis Merriam.

COYOTE Canis latrans Say

Coyotes are numerous in the eastern sections of the Park according to J. Hilton. They frequent the open parts of the Park in the summer months. The high country on Three Brothers Mountain and the Skyline probably hold the largest summer populations.

In winter, the condition becomes more complex. Mr. Hilton says they are found throughout the floors and lower slopes of the larger river valleys, being most abundant in the Copper Creek pocket and for some reason tending to concentrate in the Gibson and Allison Pass areas.

The Provincial Museum parties of 1945 report coyote plentiful in the Sunday Creek areas, while little sign and only one animal was seen during the 1949 and 1950 expeditions in the western approaches of the Park.

This race is referred to *C. l. incolatus* Hall.

WOLF *Canis lupus*

Mr. Hilton considers the wolf a transient species in the area, having observed the trails of several animals passing through in winter. Field parties encountered no positive sign of these animals in the summer months.

C. l. fuscus Richardson probably occurs here.

PINE MARTEN *Martes americana* (Turton)

Provincial Government trapping records and information received directly from local trappers indicate that marten are plentiful in the Park area. The population seems to be confined chiefly to areas of virgin-spruce forests which is the preferred or ecologically suitable habitat for this animal.

Marten are seldom seen, though abundant. A fortunate motorist may sometimes observe one crossing the road, though field parties took none during their investigations in the Park.

The races occupying the area are *M. caurina caurina* (Merriam) of the coast which probably occupies most of the area, overlapping with *M. a. abietinoides* Gray towards the Princeton side.

FISHER *Martes pennanti* (Erxleben)

Provincial fur returns since 1930 indicate that the fisher is now a rare animal in the Park area, but seems to be more abundant in the Coquihalla country to the north.

Mr. Robinson reports them plentiful in the "early days," recalling several good catches in his area (Mile 21).

Mr. Hilton saw tracks of fisher east of Allison Pass recently and a government field party observed fresh tracks in October 1951 along the Snass River, not far from the highway. Mr. Smith took a fisher on his Skagit River line in 1943.

The race here, according to Anderson (1946) is M. p. pacifica (Rhoads).

SHORT-TAILED WEASEL Mustela erminea Linnaeus

This small animal occurs in suitable habitat over the whole of the area at lower elevations; it appears to be more plentiful than the larger long-tailed species. Trapping records indicate a ratio of 5:1.

Two races may intergrade in the area, namely, M. e. fallenda Hall of southwestern British Columbia and M. e. invicta Hall of central and southeastern British Columbia.

Two specimens said to be at the University of British Columbia have not been examined.

LONG-TAILED WEASEL Mustela frenata Lichtenstein

This species generally occupies the higher country although two specimens were seen crossing the highway in the Fraser River Valley near Hope. No specimens were taken but one was seen at the Canam Mine at an altitude of 5,500 feet. The National Museum took specimens of M. f. nevadensis Hall at the Hope-Princeton summit, Myers Creek, and at Similkameen.

MINK Mustela vison Schreber

This animal occurs along the larger streams of the area and frequents the shores of lakes and beaver ponds. The Provincial Museum party observed signs at the Lightning Lakes and along Copper Creek in 1945. Trapping records indicate that the mink population is evenly distributed throughout the Park.

One race occurs, M. v. energumenos (Bangs).

WOLVERINE Gulo luscus (Linnaeus)

No specimens or signs of wolverine were observed by field parties.

Although this animal once frequented the area, Mr. Hilton has not seen it, nor any evidence of it in the past ten years. The last one killed near Princeton was taken in the Ashnola country, east of the Park, in the 1930's.

The race occurring is G. l. luteus Elliot.

OTTER Lutra canadensis (Schreber)

This species is distributed throughout the Park area in all suitable habitats, which restricts them chiefly to the Lightning Lake area and the Little Muddy. Joe Hilton reports winter signs very abundant in 1945, but observed only three animals in 1949.

Race occurring is probably L. c. pacifica (Rhoads).

SPOTTED SKUNK Spilogale phenax Merriam.

One animal taken by Harry Gordon at the Lightning Lakes about 1927 is the only record of this animal within actual Park boundaries.

The race occurring is S. p. olympica Elliot.

STRIPED SKUNK Mephitis mephitis (Schreber)

Joe Hilton and Harry Gordon have trapped striped skunk and have seen them on several occasions in the Similkameen Valley. Provincial Museum parties observed an animal in the meadows at Mile 17. The animals observed probably represent two races, those from the Similkameen, M. m. hudsonica (Richardson) and the specimen from the Hope area (Mile 17), M. m. spissigrada Bangs.

Anderson (1946) postulates a zone of intergradation in the Cascade Mountains for these two races.

AMERICAN BADGER Taxidea taxus (Schreber)

The badger probably does not occur in the Park proper but is sparsely distributed throughout the yellow pine forest north of the Sunday Creek summit, in the Similkameen Valley.

The race here is T. t. neglecta (Mearns).

COUGAR Felis concolor Kerr

Cougars are rare in the Manning Park area.

One was shot near the mouth of Little Muddy Creek by G. J. Lewis about ten years ago and in 1948 one was seen on Windy Joe Mountain. Mr. Robinson killed one several years ago in the vicinity of Mile 18. No specimens or signs were observed by recent Museum parties.

Two races probably occur; F. c. oregonensis Rafinesque on the west side of Allison Pass and F. c. missoulensis Goldman on the east, with possible intergradation within the Park boundaries.

CANADA LYNX Lynx canadensis Kerr

The lynx has become more abundant in the Park during the past few years, according to signs observed by Hilton in winter. This increase correlates with the apparent recent trend in the varying hare population. One was observed by Edwards on May 23rd 1949, a thousand feet above the Ranger Station, on Station Ridge. "The animal was concealed in a windfall, about twenty feet from the trail, and had apparently intended to remain concealed as I passed. By chance, I stopped near the animal causing it to retreat noisily."

According to winter reports, the lynx may on occasion, concentrate activities about waters frequented by beavers.

BOBCAT Lynx rufus (Schreber)

The bobcat was taken regularly, but in small numbers, by the trapper working the Skagit Valley. This is probably the dark coast form L. r. fasciatus Rafinesque. Mr. Hilton has not taken it, and believes it uncommon east of Allison Pass. Game Warden Gill has taken the species in the yellow pine forest, a few miles from the Park towards Princeton. These animals were probably of the light-coloured, larger interior form, *Lynx rufus pallescens* Merriam.

PIKA *Ochotona princeps* (Richardson)

This interesting little inhabitant of the rock slides occurs in all suitable habitats along the highway. Specimens collected by Provincial Museum parties from Mile 20 west to Hope are of the race *O. p. brunnescens* Howell. There is a gap in the collected series between Mile 20 and the Allison Pass area to the east, where the specimens taken proved to be *O. p. fenisex* Osgood, the interior form.

Suitable habitat along the highway is sporadic where long stretches of coniferous forest separate the talus slopes. The upper reaches, however, appear to provide an area of almost continuous slide, and intergradation of the two races probably takes place there. The situation may be complicated by altitudinal differences, so that the zones of intergradation are likely to be very complex. The area however furnishes excellent conditions for the study of speciation in these animals. It is probable that some intermediately located slides on the highway may harbour intergrades.

VARYING HARE *Lepus americanus* Erxleben

Provincial Museum parties in 1945 found this species abundant in the lodgepole pine thickets between Sunday Creek Summit and Copper Creek; a specimen collected at Pinewoods has been referred to the race *L. a. cascadensis* Nelson.

Edwards found them locally abundant about one mile east of Hampton Creek in 1949 but practically absent elsewhere, despite the fact that winter sign was abundant in dense stands of young lodgepole pine and up to 7,000 feet on Frosty Mountain.

Museum parties on the western slopes of the range in 1949-50 found very little sign of hares; one specimen collected at Mile 12 in 1949 was also of the race *L. a. cascadensis*. Only one other individual was observed.

From the evidence at hand it appears that the varying hare is generally more abundant on the eastern side of the range.

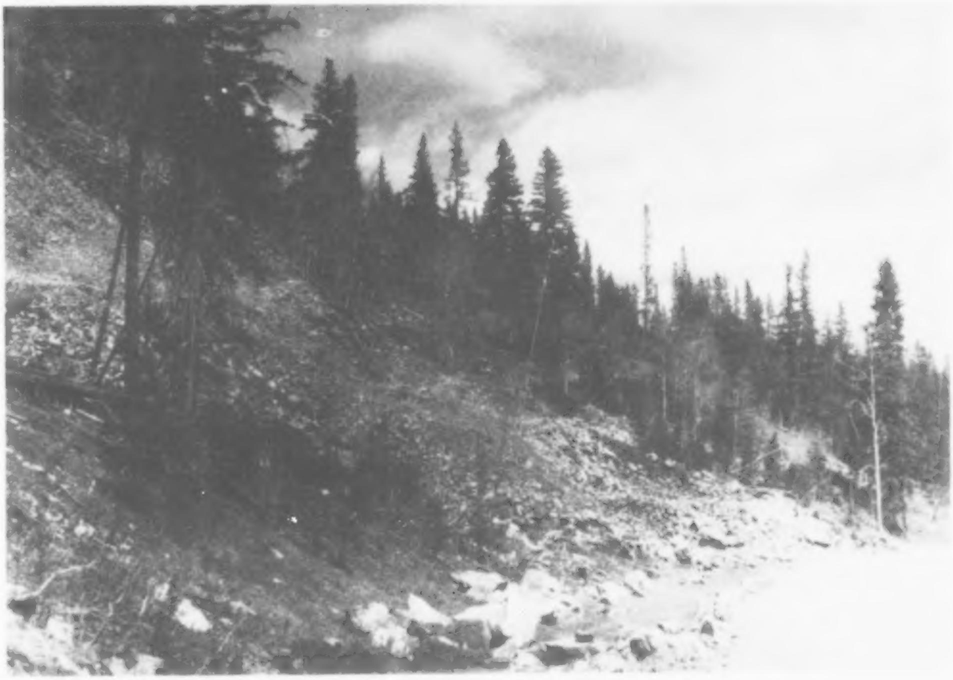

Fig. 15. Rock slide at Mile 49; habitat of pikas, marmots, and bush-rats.

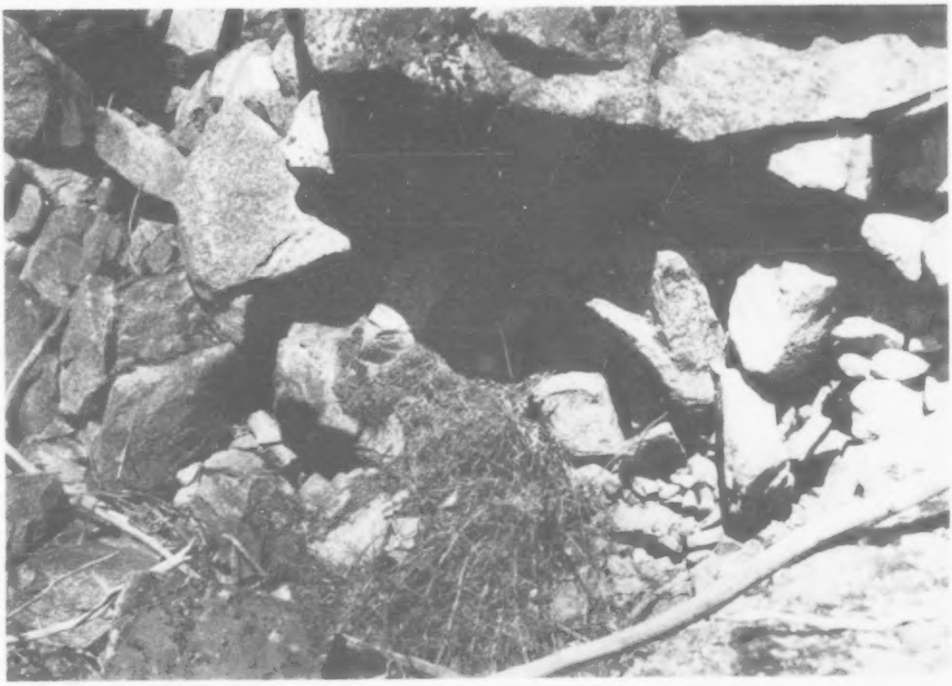

Fig. 16. "Hay pile" of pika.

YELLOW-BELLIED MARMOT Marmota flaviventris (Audubon and Bachman)

This species occupies an unusual range in relation to the Park. One may observe it in the vicinity of Hope, where it has penetrated from the interior by way of the Fraser River Valley. It was not observed in the forested areas between Hope and Allison Pass. East of Allison Pass it occurs along the roadside. The westernmost point of observation made by the Museum field party in 1945 was at Goodfellow Creek some nine miles east of the present Pinewoods site. Edwards also observed them only as far west as Goodfellow Creek in 1949. In 1950 the species was found to be common in this area and a mile or so west of Goodfellow Creek and one was seen within two miles of Pinewoods. From this it may be inferred that the animals, taking advantage of the suitable habitat presented by the newly constructed road, have extended their range westward at least seven miles in a very short space of time.

The race occurring is M. f. avara (Bangs).

HOARY MARMOT Marmota caligata (Eschscholtz)

This is an animal of the alpine country, found usually above the timberline. These large grey-mantled rodents were heard, seen, and collected in the Three Brothers and Black Wall areas by the Museum party in 1947. Edwards observed them in the same area in 1949. Joe Hilton saw one in the valley near Hanson Creek at an altitude of 4,500-feet. Hoary marmots are widely distributed in the high country throughout British Columbia where several races occur; the specimens collected here are of the race M. c. cascadensis Howell.

MANTLED GROUND SQUIRREL Citellus saturatus (Rhoads)

This is a monotypic species occurring throughout the area, usually at higher altitudes. It was common in the Timberline Valley area in 1945, and also at the Canam Mine in 1949. Edwards saw several at the Black Wall and one on Frosty Mountain in 1949. A few were seen near the highway at Goodfellow Creek.

CHIPMUNKS Eutamias sp.

Two species of chipmunk occur in the Park area, one, Eutamias amoenus felix (Rhoads) an interior form, found throughout the open, drier forests and the other, Eutamias townsendi cooperi (Baird) inhabiting the moist, spruce forests. The latter is larger, much darker, and less distinctly striped than the former. The coast form was found about the Cambie Beaver Pond, the Lightning Lakes, in Canyon Creek near the Knife Edge, in the Skagit Valley at the Whitworth Ranch, and near the first Lightning Lake. One of these animals was found in a squirrel's nest $5\frac{1}{2}$ feet up a spruce tree.

The bright interior form is by far the more abundant and universally distributed, occurring from about 3,000 feet at Copper Creek, 6,000 feet on Lone Goat Mountain, over 7,000 feet on Three Brothers Mountain, and on the very top of Frosty Mountain's highest peak, at 7,900 feet. They were first out of hibernation in the second week of May, at 4,000 feet, and were still active in mid-October.

Both species were found occupying common range near the Canam Mine in 1949.

RED SQUIRREL Tamiasciurus hudsonicus Erxleben

This is the common squirrel in the eastern sections of the Park extending west into the transition belt beyond Allison Pass and westwards at least as far as Mile 21. It is characterized by white underparts. Edwards found them abundant in the Park area in the summer of 1949. Museum parties took specimens in the cedar-hemlock stands east of Allison Pass, and at Whitworth Ranch in the Skagit Valley.

T. h. streatori Allen is the race occurring here.

RED-BELLIED SQUIRREL Tamiasciurus douglasii Bachman

This is the animal of the coast region; found in the Douglas fir-spruce-hemlock forests, it extends eastward to the transitional zones of Allison Pass. It is characterized by reddish underparts.

The Museum party took a specimen in 1945 one mile east of Pinewoods at Dead Lake, and Mr. Hilton has seen them as far east as the mouth of the Chuwanten Creek.

The race occurring here is T. d. mollipilosus Audubon & Bachman.

FLYING SQUIRREL Glaucomys sabrinus (Shaw)

According to trappers these animals are very abundant in the Park, particularly in the spruce-balsam forests where many are taken in the winter months.

Specimens trapped on the west side of the range at Mile 20, and on the east side at the Lightning Lakes, Cambie Beaver pond, and Princeton were of the race G. s. fuliginosus (Rhoads). The records indicate that only this race occurs in the Park.

POCKET GOPHER Thomomys talpoides Richardson

This burrowing rodent, incorrectly called "mole," is common in the open habitats throughout the Park to an altitude of 6,500 feet. It is seldom seen, as it lives beneath the surface, but labyrinthine ridges of earth from winter activity, and fresh mounds literally cover the sod in places. Altogether the huge volume of earth turned over annually must have a profound effect upon the areas occupied.

Five specimens taken at Allison Pass in 1945 were of the race T. t. fuscus (Merriam).

BEAVER Castor canadensis Kuhl

Beaver have been long established in the Park area, though many ponds are now abandoned. Both abandoned and occupied ponds seem to be of great age judging from the appearance of the dams and lodges.

Animals were observed on the Sumallo River, the Cambie Campsite, and at Dead Lake. Edwards found fresh evidence of beaver between the second and third Lightning Lakes, in Gibson Pass and at Beaver Tree Lake, but considers the whole area as marginal range for the species.

The race here is probably C. c. pacificus Rhoads.

WHITE-FOOTED MOUSE Peromyscus maniculatus (Wagner)

This is the common mouse throughout Canada and the United States, found almost everywhere in a great variety of ecological conditions. It is a plastic species subject to great geographical variation.

Field parties secured two races of this mouse within the area. Peromyscus m. oreas Bangs occupies the greater part of the range, intergrading with Peromyscus m. artemisiae (Rhoads) in the Goodfellow Creek area to the east where specimens of both races were secured, and possibly with Peromyscus m. austerus (Baird) in the Hope area to the west, where one specimen taken shows characteristics of both races, (oreas x austerus).

BUSHY-TAILED WOOD RAT Neotoma cinerea (Ord)

This rodent is called the "Pack rat" in British Columbia. It occupies rock slides, abandoned cabins, and dry wind falls throughout the Park. Along the highway, sign was observed in most of the rock slides between Hope and Princeton. These animals are often seen foraging by day, especially in the slides.

Specimens collected at Goodfellow Creek were of the race N. c. occidentalis Baird; as were specimens taken by the National Museum at Hope, Princeton, and at points in the Similkameen Valley.

LEMMING MOUSE Synaptomys borealis (Richardson)

The lemming mouse is not common in the Manning Park area. Specimens were taken in the Timberline Valley (6,500 feet), Buckthorn Camp (6,000 feet) and at the Cambie Beaver Pond (4,000 feet).

The race occurring is S. b. wrangeli Merriam, which occupies the coastal strip in the Canadian zone from Alaska to north-western Washington.

PHENACOMYS Phenacomys intermedius Merriam

This is considered a rare mouse throughout its range. The few specimens collected in Manning Park were of the race P. i. oramontis Rhoads which ranges over the west slope of the Cascades and Coast Ranges above 4,500 feet in southwestern British Columbia, in the Hudsonian zone of the Olympic and Cascade Mountains of Washington, and as far south as central Oregon (Anderson 1946).

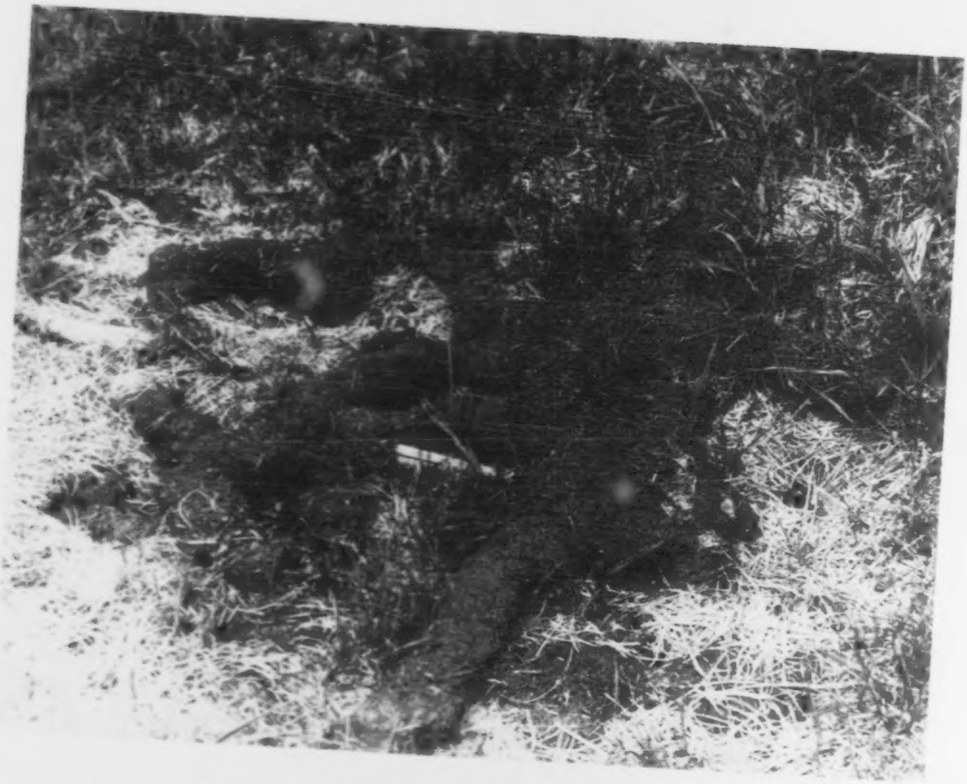

Fig. 17. Winter "workings" of pocket gopher.

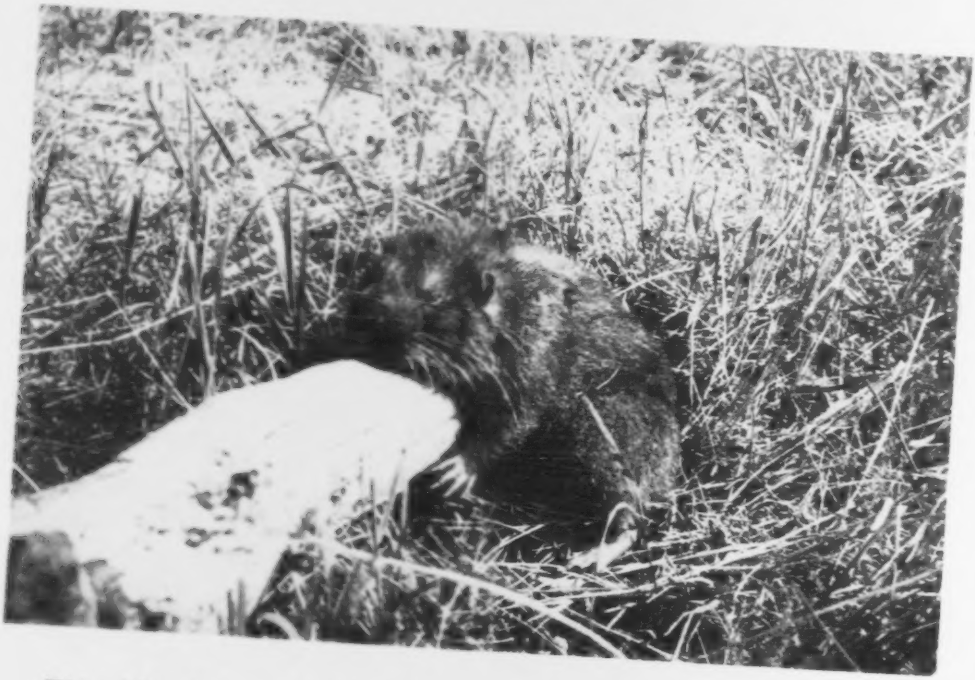

Fig. 18. Mountain beaver, a nocturnal, burrowing animal.

RED-BACKED MOUSE *Clethrionomys gapperi* (Vigors)

The Red-backed mouse was evenly distributed over the area under consideration. Museum parties found it uncommon in Manning Park in 1945. Edwards and Cowan found it plentiful there in 1949, predominating catches in spruce forests, lodgepole pine, and alpine meadows. In 1949 Museum parties found it plentiful in the river bottoms west of Allison Pass; several specimens were taken at Mile 20 and one near the Canam Mine at 5,500 feet.

The race occurring here is *C. g. cascadensis* Booth.

DRUMMOND'S MEADOW MOUSE *Microtus pennsylvanicus* (Ord)

This is a common meadow mouse on the eastern sides of the range. National Museum parties collected specimens at the Hope-Princeton summit in 1927. Edwards reports them common about the beaver ponds and took one specimen at 6,000 feet on Three Brothers Mountain. At the western extremity of the area near Hope no specimens were taken.

The race here is *M. p. drummondii* (Audubon and Bachman).

LONG-TAILED MEADOW MOUSE *Microtus longicaudus* (Merriam)

This species is well represented in the area; specimens were taken at Mile 17 and Mile 21 along the highway by Provincial Museum parties, and at North Star Creek and about the beaver ponds in Manning Park by Edwards.

The race is *M. l. mordax* (Merriam).

AGASSIZ MEADOW MOUSE *Microtus oregoni* (Bachman)

This vole was not abundant in the Park area and only two specimens were recorded in the western section (Mile 17). The only specimen taken in the Timberline Valley is tentatively included with the race occurring to the west, *M. o. serpens* Merriam, as was a specimen picked up on the road at Pinewoods by Edwards in 1949.

RICHARDSON'S MEADOW MOUSE Microtus richardsoni (DeKay)

This large mouse occurs sporadically in the high country throughout British Columbia north to Jasper. In Manning Park Museum parties secured three specimens in the Timberline Valley. Edwards found the remains of this mouse in coyote scats.

The race occurring is M. r. richardsoni (DeKay).

MUSKRAT Odonatra zibethica (Linnaeus)

The muskrat is uncommon in the Park area. Mr. Hilton saw them only on a large slough, in the hills above the junction of Copper Creek and the Similkameen. This slough appears to be the only suitable muskrat habitat within the Park boundaries.

The race occurring is O. z. osoyoosensis (Lord).

MOUNTAIN BEAVER Aplodontia rufa (Rafinesque)

This unusual animal is a characteristic associate of the coast forests, occurring in Manning Park in pockets of coast-type forest. It probably reaches the eastern extremity of its range in this Park. Burrows were found in suitable locations, both on the valley floor at Allison Pass, and on wet hillsides up to 6,000 feet, notably around North Star Lookout above the Ranger Station. It was also noted at 6,500 feet on Frosty Mountain above the second Lightning Lake. The most easterly evidence of its occurrence was found on the slopes above Rabbit Flats, a short distance east of the mouth of Hampton Creek.

Museum parties secured specimens in Timberline Valley and at a point one mile west of the Allison Pass marker in 1945. Other specimens were taken at the Canam Mine site. The National Museum has two specimens taken near Hedley, B. C.

The race occurring in the area is A. r. rainieri Merriam which probably intergrades with A. r. rufa (Rafinesque) in the area southwest of Hope.

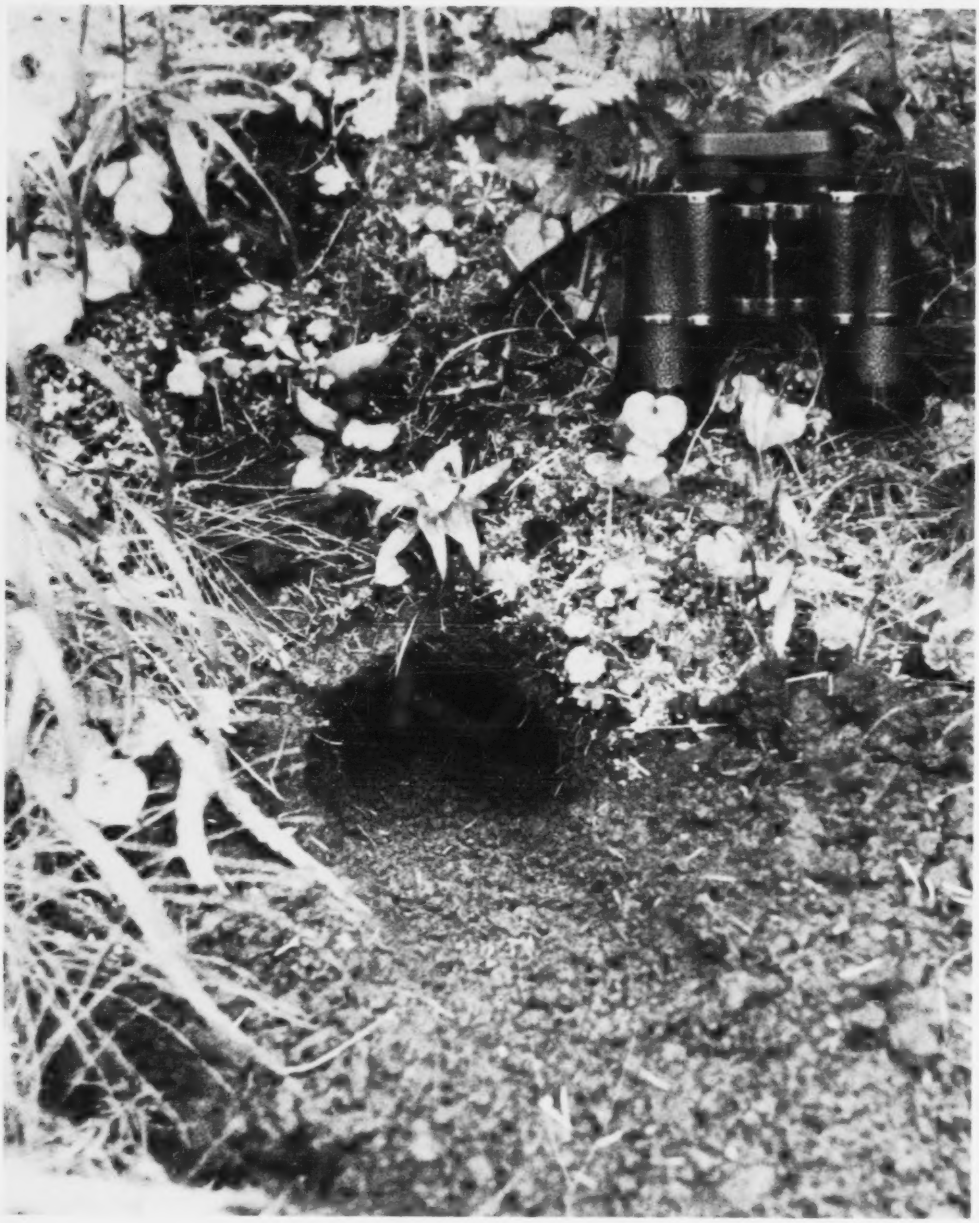

Fig. 19. Freshly dug mountain beaver burrow; Windy Joe Mountain.

(Photo by R. York Edwards.)

JUMPING MOUSE Zapus princeps (Allen) and Zapus trinotatus Rhoads

Two species of jumping mice occur in the area; to the west Zapus trinotatus occupies the range, to the east Zapus princeps is found. The species were found occupying the same range in the region of Allison Pass, Pinewoods, and Timberline Valley. No intergradation was apparent. Individuals of the same species were caught on the same trap line, in some cases in the same traps.

Specimens taken at Mile 17 and Mile 21 out of Hope were Zapus trinotatus trinotatus (Rhoads); those on the eastern side, Zapus princeps kootenayensis Anderson.

PORCUPINE Erethizon dorsatum (Linnaeus)

Museum parties observed porcupines on two occasions in 1945, a female with one young in the Timberline Valley and one animal at the present Pinewoods site. In 1947 one was observed in the Skagit Valley. Edwards saw none personally but had reports of animals seen at Hanson Creek and Twenty Minute Lake. No sign and no animals were observed on the western side of the area in 1949 and 1950.

The race occurring here is E. d. nigrescens Allen.

ELK Cervus canadensis (Erxleben)

Elk have been liberated twenty miles north of the Park and appear to be enlarging their range. Edwards (1949) states the Park is too high for good elk habitat and that there can be little assurance of success in introducing these animals there.

The specimens introduced are of the race C. c. nelsoni Bailey.

MULE DEER Odocoileus hemionus (Rafinesque)

Two races of deer occur in the Park area O.h. hemionus of the interior, the large mule deer, and O. h. columbianus of the coast, the smaller black-tailed deer. These races almost certainly intergrade in the western sections of the area under discussion. No specimens were taken by Museum parties. Those observed in the field appeared to be mule deer; all of them, seen on the eastern side of the range, were large animals.

Edwards reports no great abundance of sign or animals in the Park area, an observation made also by Museum field parties.

MOOSE Alces americana (Clinton)

There is, as yet, no record of these animals in the area under discussion.

MOUNTAIN SHEEP Ovis canadensis Shaw

A lone ram is reported to have ranged the Three Brothers Mountain area in the early 1930's but apparently no sheep exist in the Park at the present time.

The race occurring in the Ashnola is O. c. californicana Douglas, and the lone animal reported was probably of this race.

MOUNTAIN GOAT Oreamnos americanus (Blainsville)

In the Park proper this species was found in only one restricted area. For many years it has been known to occur on the mountains about Lightning Creek on either side of the 49th Parallel, extending up the creek as far as Frosty and Lone Goat Mountain. Edwards saw one animal near Lone Goat Mountain, but saw neither goats nor their sign in the vicinity of Frosty Mountain.

Provincial Museum parties observed no goats or sign at Mount Gordon, while only one animal was seen south of there on the ridges overlooking the Skagit Valley.

The rocky bluffs of the mountain lying to the south of the road at Mile 21, however, are good goat range. Museum personnel spent several days on the ranges there in 1950 and observed a number of goats, while sign in the area indicated a substantial population. The wide expanse of rugged country to the south of this mountain is splendid goat range and probably harbours a large population. In all, three males, one a very large specimen, and fourteen females were observed in the area visited. All females, except one, had a newborn kid (born in the last week of May), which indicated a total of 30 goats at least, on this end of the range. The female without young, when

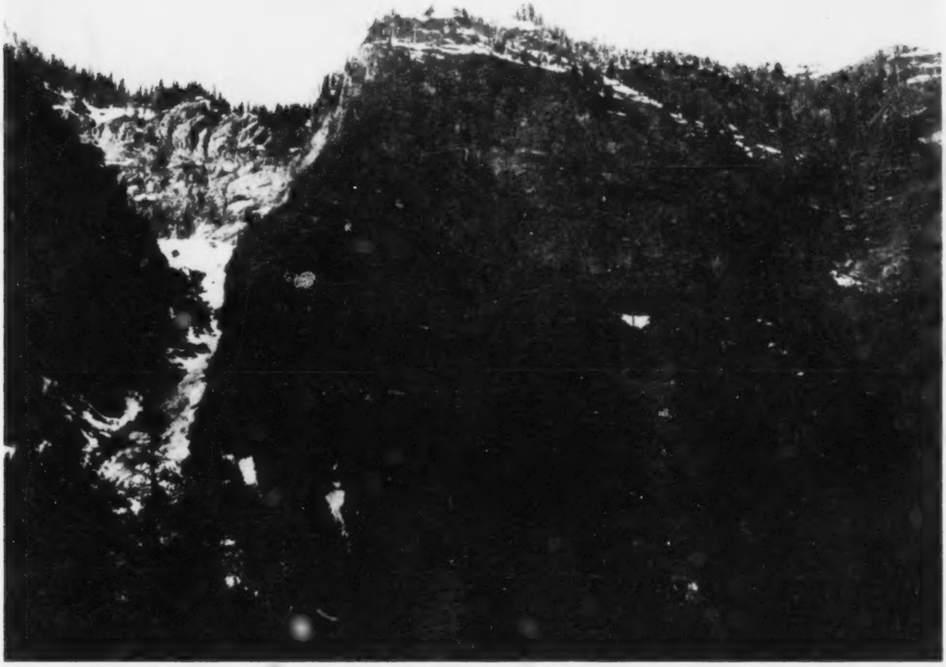

Fig. 20. Rock bluff at Mile 21, habitat of mountain goats.

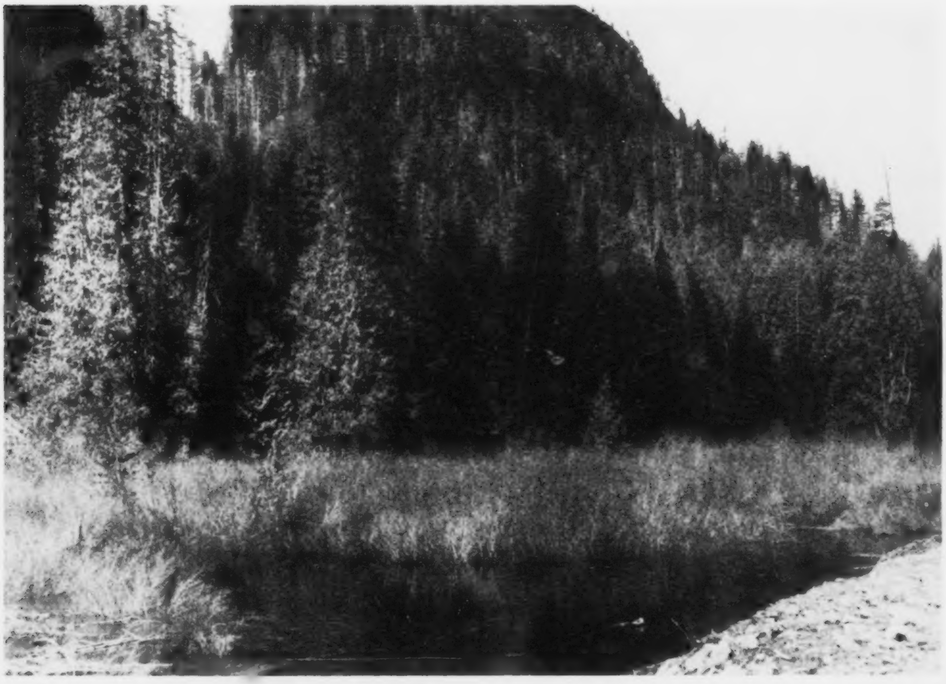

Fig. 21. Backwater of Summallo River, Mile 20, Hope-Princeton Highway.

collected, was found to be carrying a foetus. This animal was in fine condition, though not fat; autopsy revealed no gross evidence of parasitism. The other goats observed, often at very close range with field glasses, appeared to have wintered well. The males were exceedingly wild and difficult to stalk, (one was shot above a snowslide in what appeared to be an ideal location. The animal, however, in its death struggle, lodged in a crevasse formed by snow and rock and was not recovered). A large kid (possibly a yearling) was observed dead at the base of a high cliff, killed accidentally or possibly shot and unrecovered. Bill Robinson reports a large population occupying the high ranges to the north of the road. He also states that goats are plentiful in the Canyon of the Snass, a report backed by photographs of successful hunting parties in that area.

Goats had wintered on the low slides and rocky shoulders very close to the highway. Robinson reports animals being shot from the road, and has heard shots on numerous other occasions which indicates that sniping from the road is of frequent occurrence. This is deplorable, as the nature of the terrain here makes recovery virtually impossible.

The goats had moved off the lower shoulders and were working the skyline of the bluffs in June. Beyond the horizon seen from the road, the vast country to the south was for the most part covered in deep snow; the slopes facing southwards, however, were probably clear. Goats were cropping the new growth of almost every plant that grew in the area, a strong preference for false solomon seal, Similacina racemosa and false box, Pachystima myrsnites was noted; the stomach contents of the specimen taken contained almost 100% false box by gross examination.

In summarizing the status of mountain goats occurring close to to the highway, it may be concluded that:

They occur only along a restricted stretch of approximately two miles in the vicinity of Mile 21 (Bill Robinson's cabin).

They are confined to the south side of the road, and represent one of the very few mountain goat populations that can be observed without strenuous climbing.

A total of 30 goats was observed by the Provincial Museum field parties in 1950.

From our data, and information supplied by Bill Robinson, the goats appear to concentrate on this stretch of terrain in September and remain, easily visible from the road, until approximately the first week in June, although individuals have been observed the year round.

This population has maintained itself under local hunting pressure from nearby towns in the Fraser Valley in past years, but the area is now so easily accessible that it will be most surprising if increased hunting pressure does not drive or eliminate goats from the immediate environs of the highway. Sportsmen who desire to add this animal to their trophies should not expect to take it from a public thoroughfare. However, when such a trophy presents itself, rare is the hunter who will pass up the opportunity. For this reason some well-publicized restrictions should be imposed in order to maintain goats on "Robinson's Ridge," where they may be enjoyed by everyone passing along the road.

In October 1951, eleven goats were observed on the slides at the base of Hopeless Mountain, near Snass Creek. The animals were feeding upon willow (Salix sp.), Cow parsnip (Heracleum lanatum), edible thistle (Cirsium edule), alder (Alnus sitchensis), and practically everything else that occurred. The herd was made up of five adult females, three young of the year, and three animals of intermediate size which were probably two-year-olds.

BIRDS

The material on birds in the Manning Park area is presented in the form of an annotated list. In the limited time available little accurate quantitative work could be done. The list here presented was compiled from data secured, for the large part, by field parties of the Provincial Museum of British Columbia; the British Columbia Forest Service; and the National Museum of Canada.

Subspecies referred to here were determined from actual specimens; where possible these were examined by Dr. Ian McTaggart Cowan of the University of British Columbia, by Earl Godfrey of the National Museum, and by Mr. C. J. Guiguet of the Provincial Museum. In cases where no specimens were secured the probable race occurring is indicated on a geographical basis. For this purpose "A Review of the Bird Fauna of British Columbia" by Munro and Cowan (1947) was consulted.

The order, vernacular, and scientific names of species follows the same text.

COMMON LOON Gavia immer (Brunnich)

Reported by all parties to occur regularly on the Lightning Lakes where it probably nests.

WESTERN GREBE Aechmophorus occidentalis (Lawrence)

C. Lyons and J. Symonds found and photographed one of these birds in the fall of 1948. It had landed in the Park during migration. No other records were secured.

MALLARD Anas platyrhynchos Linnaeus

The small lakes and beaver ponds in the Park support a few pairs of mallards. Two females successfully raised broods on Dead Lake in 1949 according to Edwards. The nest of one was not found, but the nest of the other, located on May 25, contained three eggs which were promptly abandoned. Her second nest was found on June 15, and these nine eggs she successfully hatched; the newly hatched young were seen on June 30.

The race occurring here is A. p. platyrhynchos Linnaeus.

PINTAIL Anas acuta Linnaeus

In August 1949 one pintail was observed on Lone Duck Lake by Edwards. This represents the only record for the species in the Park area. It is highly probable, however, that during periods of migration they are not uncommon.

GREEN-WINGED TEAL Anas carolinensis Gmelin

A pair stopped on a slough near Copper Creek on June 22, 1949 the only observation made by parties in the area.

WOOD DUCK Aix sponsa (Linnaeus)

A Provincial Museum field party recorded a lone male on a small pond near the Cambie Beaver Pond July 26, 1945.

BARROW GOLDEN-EYE Glaucionetta islandica (Gmelin)

Recorded from May to September on Perdue Lake, Twenty Minute Lake and Dead Lake.

HARLEQUIN DUCK Histrionicus histrionicus (Linnaeus)

Harlequin ducks nest in the Manning Park area; a female and six downy young were observed on the Sumallo River on July 19, 1949.

Courting behaviour was observed at Mile 21 on the Sumallo and at Dead Lake near the end of May in 1950. Another pair was observed on the Similkameen four miles east of Pinewoods. At this time, especially on the western slopes, the Harlequins were seen regularly along the waterways adjoining the highway. After breeding the males leave the fresh water and return to the sea. The females are left to raise the brood. At this time they are difficult to observe. The family seen on July 19 was sunning on a log in an open pond, but immediately took to the water under the overhanging willows along the banks and disappeared up the stream offering no possible chance of taking a specimen.

The profusion of mountain streams in the area, observations of several courting pairs in the spring, and the presence of downy young indicate that the Harlequin duck breeds regularly there.

The race occuring is H. h. pacificus W.S Brooks.

AMERICAN MERGANSER Mergus merganser Linnaeus

This species was observed by all field parties; lone individuals were recorded for July and August in 1945 and 1949 while a few pairs were seen in May. No breeding records were obtained.

The race occurring is M. m. americanus Cassin.

HOODED MERGANSER *Lophodytes cucullatus* (Linnaeus)

A dull-plumaged pair was reported by Edwards in August. They frequented Lone Duck and Twenty Minute Lakes from August 2 to 8.

GOSHAWK *Accipiter gentilis* (Linnaeus)

This species has been observed in the area throughout the year. Museum and forestry field parties have recorded occasional lone individuals in the summer months, but no evidence of nesting was secured; Hilton reported occurrences during the winter months.

The race is probably *A. g. atricapillus* (Wilson).

SHARP-SHINNED HAWK *Accipiter striatus* Vieillot

These hawks were recorded as migrants only, passing through in late August and early September.

The race *A. s. perobscurus* Snyder may occur in the western extremities of the area (Hope), but distribution records indicate *H. a. velox* Wilson as the most probable. No specimens were examined.

COOPER HAWK *Accipiter cooperii* (Bonaparte)

This species has the same status in the area as the sharp-shinned hawk, appearing as a migrant in late summer and early fall. Edwards recorded a few in midsummer. Museum parties recorded none in the western reaches.

RED-TAILED HAWK *Buteo jamaicensis* (Gmelin)

This hawk is resident in the Park. Pairs were observed by Museum parties in the summer of 1945 at Allison Pass and in the Timberline Valley. Edwards observed them regularly from May through September in 1949. Museum parties recorded the bird only once on the western slopes in July 1949 at Mile 20, and one was seen on the goat ranges above Robinson's cabin at Mile 21 in May 1950.

The race here is probably *B. j. calurus* Cassin.

SWAINSON HAWK Buteo swainsoni Bonaparte

Edwards reports a pair in 1949 on the Blackwall, probably nesting. No other records were secured.

GOLDEN EAGLE Aquila chrysaetos (Linnaeus)

Apparently uncommon in the area. Museum field reports for 1945 show one record, a feather found on Three Brothers Mountain in August. Three individuals were observed by a Museum party on Mount Gordon in July 1949, and two were seen near the Snass River in October 1951.

BALD EAGLE Haliaetus leucocephalus Linnaeus

Not recorded by field parties in the summer, but Hilton reports it not uncommon during the winter months.

Geographical race is H. l. washingtoniensis (Audubon).

MARSH HAWK Circus cyaneus (Linnaeus)

A single bird seen in flight from the peak of Three Brothers Mountain in 1945 was recorded as "probably of this species." In view of the habitat and distance at which the observation was made the authenticity of this record is questioned. No other records were secured in the area.

OSPREY Pandion haliaetus (Linnaeus)

The osprey appears to be confined to the Lightning Lake area. Young were heard calling from a nest on the east side of the first lake in August 1945. A lone bird was seen in flight at Little Muddy Creek in July 1949, and another at Goodfellow Creek in May 1950.

The race occurring is probably P. h. carolinensis (Gmelin).

PRAIRIE FALCON Falco mexicanus Schlegel

A bird collected by Dr. McTaggart Cowan at the Blackwall on August 27, 1949 is our only record of this species in the Park.

DUCK HAWK Falco peregrinus Tunstall

One bird observed by Edwards at 7,900 feet on Frosty Mountain, August 28, 1949.

The race occurring here is probably F. p. anatum Bonaparte.

SPARROW HAWK Falco sparverius Linnaeus

This is the most common hawk in the area under discussion, particularly on the eastern slopes where the habitat is more suitable for nesting. Edwards found the sparrow hawk numerous in the burns east of the Allison Pass, at Tangle Top, and at Gibson Pass. It was abundant in the alpine meadows in late August.

A nesting record was secured by the Museum party in the Timberline Valley in 1945. No birds were observed on the western slopes in July 1949, but they were present at Goodfellow Creek in May 1950.

The race occurring is F. s. sparverius Linnaeus.

BLUE GROUSE Dendragapus obscurus (Say)

Blue grouse occur throughout the area, appearing to favour the higher open slopes and the topmost ridges where adequate cover prevailed.

Edwards reports hooting males from the date of his arrival May 10 until the end of May. Two nests were discovered in early June (1st week); one on the upper slopes of Windy Joe and one at Lovely Creek. The latter was under predation at the time of observation and contained only three eggs, one complete, one damaged, while a Canada Jay had the other.

The Windy Joe nest contained only four eggs. The first young were observed about the third week of June, broods ranged from one to eight individuals with an average of four. As in other areas, a wet spell coinciding with the breeding period of gallinaceous birds has a detrimental effect, which may account for the comparatively low average-brood size observed in 1949 by Edwards.

Museum parties collected several male blue grouse from the area.

Only the easternmost records--two specimens from Allison Pass show possible intergradation with the eastern race Dendragapus obscurus pallidus (Swarth) which occupies the dry side of the range in the Princeton area. The birds collected west of Allison Pass were of the race D. o. fuliginosus (Ridgway).

FRANKLIN GROUSE Canochites franklini (Douglas)

Franklin grouse, often termed Fool Hen, were abundant in the pine and spruce forests around Allison Pass in the summer of 1945 and again in 1949. None was observed in the fir stands and spruce-hemlock associations on the western slopes, although they undoubtedly occur to a lesser degree.

In 1945 and 1949 field parties recorded average brood size at 2.9 and 3.2 chicks respectively. The low brood size may possibly be due to wet conditions at hatching in both springs under consideration, as it was in the case of blue grouse.

Edwards noted a population movement up the slopes from the pine forests to open Douglas fir stands as summer progressed, at which time both Franklin and blue grouse were found occupying the same range.

RUFFED GROUSE Bonasa umbellus (Linnaeus)

This species is not common in the Park, for suitable habitat is restricted. Deciduous shrubs or trees are an essential element to this bird's environment and it occurs only where these are found. Its range follows the Similkameen River closely, from Copper Creek at least as far upstream as Hanson Creek, at 4,000 feet elevation.

This bird is often wary, its behaviour contrasting markedly with the lack of fear found in the Franklin grouse and ptarmigan, and at times in the blue grouse.

About the Ranger Station, at 4,000 feet, ruffed grouse were last heard drumming on June 18.

One brood of three was seen at Crowley Creek on June 21.

More collecting along the highway from Hope to Princeton is needed to clarify the position of B. u. affinis (Aldrich and Friedman) of the interior and B.u. sabini (Douglas) in the lower Fraser Valley as a zone of intergradation may occur in the area.

WHITE-TAILED PTARMIGAN Lagopus leucurus (Richardson)

These birds were recorded once by Edwards in 1949 and three times by Museum parties in 1945. They frequent the highest rocky ridges in the summer months and are often locally abundant in distribution; they could be easily overlooked in an area which actually harbours a sizeable population.

In Manning Park they were observed only on Three Brothers and Frosty Mountains.

The race occurring is L. l. leucurus (Richardson).

SORA Porzana carolina (Linnaeus)

This marsh bird was found only in the slough above Copper Creek, where, judging from the noise rising from the dense vegetation there would seem to be a large population in the summer of 1949. This species was not recorded by summer field parties in the western reaches where suitable habitat was lacking. In the lower Fraser Valley, (Chilliwack and Vancouver) summer records of this species are not uncommon.

KILLDEER PLOVER Charadrius vociferus (Linnaeus)

One recorded on August 23, 1949 at Copper Creek was probably an early-fall migrant.

Geographical variation C. v. vociferus (Linnaeus).

SPOTTED SANDPIPER Actitis macularia (Linnaeus)

This species, known locally as "Teeter," occurs regularly about ponds, lakes, and the larger streams. It was most often seen along the gravel bars of the Similkameen.

SOLITARY SANDPIPER Tringa solitaria Wilson

These birds appeared about beaver ponds in late August, obviously migrating through the area. No specimens were examined but the race T. s. cinnamomea (Brewster) is likely to occur here.

GREATER YELLOW-LEGS Totanus melanoleucus (Gmelin)

One, observed by a Museum party along the highway ditch at the Trites Ranch in early July, 1949 was probably a late-spring migrant.

BAND-TAILED PIGEON Columba fasciata Say

This species was not recorded by field parties in 1945 and 1947. Edwards records a single occurrence at the Blackwall on August 19 in 1949, and four at Frosty Mountain on August 31 of the same year. A flock of twelve individuals was observed by Museum parties on three occasions in mid-July of 1949, between Mile 10 and 13. The records to date indicate this species as uncommon in the area and probably reflects the status of band-tailed pigeons throughout British Columbia although an increase was apparent on Vancouver Island in the spring of 1950.

The race occurring is C. f. monilis Vigors.

MOURNING DOVE Zenaidura macroura (Linnaeus)

This species is uncommon in the area. Edwards recorded none while Museum parties recorded only two individuals; one on the Skagit near the Whitworth Ranch, and one at Mile 26, at the junction of the Skaist and Skagit Rivers.

These birds are more likely to be observed on the dry, Princeton side than on the western slopes.

Geographical variation is probably Z. m. marginella (Woodhouse).

HORNED OWL Bubo virginianus (Gmelin)

Horned owls were common throughout the area. Young birds were observed by the Museum party in 1945, establishing a breeding record for the Park, an occurrence to be expected in such an ubiquitous species.

No specimens were collected, but on a geographical basis *B. v. lagaphonus* (Oberholser) probably occurs east of Allison Pass and *B. v. occidentalis* Stone to the west, with a possible zone of intergradation in Manning Park.

PYGMY OWL *Glaucidium gnoma* Wagler

This species was heard on several occasions. It was recorded at Whitworth Ranch in May, 1947 and above the Ranger Station, Hampton Creek, and Copper Creek in the summer of 1949. It appeared to favour the open, Douglas fir stands at higher altitudes (above 5,500 feet).

The race occurring is probably *G. g. swarthi* Grinnell.

SPOTTED OWL *Strix occidentalis* (Xanthus)

The spotted owl has been recorded three times in the Manning Park area. Twice by Mr. Arthur Peake, at Miles 15 and 23 on the highway, and once at Pinewoods by Mr. York Edwards.

The bird is considered uncommon in British Columbia; the race occurring is *S. o. caurina* (Merriam).

LONG-EARED OWL *Asio otus* (Linnaeus)

Two were seen in mid-August in alpine country, one at Buckhorn Camp and one at 7,000 feet, about a mile northwest of Three Brothers Mountain.

Geographical variation is probably *A. o. wilsonianus* (Lesson).

SAW WHET OWL *Cryptoglaux acadica* (Gmelin)

Several years ago, Mr. Hilton found a number of small owls dead in the snow during a period of intense cold. Most were found south and west of Copper Creek, in the Similkameen Valley. They were probably of this species, a probability strengthened by reports of these owls dying in other localities.

Museum parties heard a saw whet calling near the present site of Pinewoods in July 1945 and again in May 1950, but no specimens were taken.

The race occurring is C. a. acadica (Gmelin).

NIGHTHAWK Chordeiles minor (Forster)

These birds were seen regularly in the evenings during the summer months, over the dry Copper Creek pocket and the Cambie Beaver Pond area, where they appeared in numbers.

C. m. minor (Forster) is the race occurring.

BLACK SWIFT Nephoecetes niger (Gmelin)

The Museum party in the summer of 1945 recorded a flock of thirty black swifts at the Cambie Beaver Pond on July 25, two at Three Brothers Mountain on August 4, and "several" on the Skyline Ridge. Edwards reports seven at Gibson Pass on June 18, 1949 and saw "several" in the high country north of the Ranger Station during July and August of the same year. On Little Muddy Creek at an altitude of 6,000 feet he observed seventeen of these birds flying north.

These summer records indicate breeding colonies in the Manning Park area, although none was discovered.

The race here is N. n. borealis (Kennerly).

VAUX SWIFT Chaetura vauxi (Townsend)

This species was seen on two occasions, on June 11 and again on June 15, 1949 over Dead Lake.

RUFOUS HUMMINGBIRD Selasphorus rufus (Gmelin)

This is the common hummingbird in the Park, as it is elsewhere in British Columbia. They were seen most frequently where showy, flowering shrubs occurred and about the willow thickets. In late summer they were seen in the alplands.

CALLIOPE HUMMINGBIRD Stellula calliope (Gould)

A lone individual was observed at Gibson Pass on June 18, 1949. None other was recorded from the area.

BELTED KINGFISHER Megaceryle alcyon (Linnaeus)

A regular inhabitant of the ponds, lakes, and larger streams throughout the Park, the kingfisher was present in small but conspicuous numbers.

RED-SHAFTED FLICKER Colaptes cafer (Gmelin)

The flicker is a bird of open and semi-open forests, found in greatest numbers in Douglas fir, in burns, and in parts of the lower alpine meadows. While it was seen upon occasion in less open forests, none was recorded from the dense stands. It occurs generally throughout the area from Hope to Princeton.

C. c. cafer (Gmelin) is the race postulated for this area; no specimens were examined.

PILEATED WOODPECKER Ceophloeus pileatus (Linnaeus)

This large woodpecker was observed most often in the spruce forests, but occurs throughout the area. In Manning Park it was seen regularly along Windy Joe Creek in 1949. No specimens were taken by any field party; the race here is probably C. p. picinus (Bangs).

YELLOW-BELLIED SAPSUCKER Sphyrapicus varius (Linnaeus)

There is some disagreement as to whether this and the following form, are full species or are races of one species. Intergrades have been taken, but the two have been known to occur in the same area and not cross. The two occur in Manning Park and no hybrids were reported by Museum field parties. The yellow-bellied form was more numerous than the other. A yellow-bellied and red-breasted sapsucker were observed, apparently mated, in the recently burned area west of Allison Pass; nest and birds were under observation by Thomas Howell, graduate of the University of California, who was conducting research on this problem in 1950. He reported hybrids in the area as well. The results of his research have yet to be published.

The yellow-bellied sapsucker seems to be confined primarily to the eastern side of the range, where the race occurring is *S. v. nuchalis* Baird.

RED-BREASTED SAPSUCKER *Sphyrapicus ruber* (Gmelin)

This is the sapsucker of the wet coastal belt; it occurs west of Allison Pass for the most part, although Edwards saw many in the dry Copper Creek pocket. No specimens were recorded east of the pass by Museum parties. In 1945, they were rare in the area, the Museum party recording only that Hilton had seen them west of the pass; they saw none. In 1947 they were observed in the Skagit at the Whitworth Ranch, and in 1949 and 1950 they occurred regularly along the highway between Hope and Mile 21.

Geographical variation is *S. r. ruber* (Gmelin).

WILLIAMSONS SAPSUCKER *Sphyrapicus thyroideus* (Cassin)

One specimen taken by Dr. I. McTaggart Cowan near Towers Camp May 15, 1950 represents the westernmost record for this species.

The race is *S. t. thyroideus* (Cassin).

HAIRY WOODPECKER *Dryobates villosus* (Linnaeus)

Few hairy woodpeckers were observed in the area and no specimens were taken by the various field parties in 1945, 1947, 1949, and 1950.

A pair nested in the burn on Tangle Top and two nests were found in the lodgepole pine bottom lands of the Similkameen Valley. These nests contained young birds in June.

A zone of intergradation between the race D. v. harrisi (Audubon) of the coast and the interior race D. v. monticola Anthony may occur in the area.

DOWNY WOODPECKER Dryobates pubescens (Linnaeus)

It is noteworthy that this species was not recorded by any field party in the summer months.

WHITE-HEADED WOODPECKER Dryobates albolarvatus (Cassin)

A specimen in the Provincial Museum is said to have been collected in the Similkameen Valley, which may place it on the Park list although the exact locality was not recorded. Two specimens have since been taken in the Okanagan, but the bird is of very rare occurrence in British Columbia.

It is easily recognized in the field, being totally black, with a white head and a showing of white on the wings.

The race occurring is D. a. albolarvatus (Cassin).

AMERICAN THREE-TOED WOODPECKER Picoides tridactylus (Linnaeus)

These birds nest in the jack pine forests in the Allison Pass area. Edwards observed them in the same habitat-type near the mouth of Little Muddy Creek.

Nesting holes were observed at Pinewoods and in the jack pine flats along the Lightning Lake road. One occupied nest was discovered near Dead Lake in June.

Specimens taken were of this species, as were other birds observed. Specimen records of the Arctic three-toed woodpecker, Picoides arcticus (Swainson), have been secured at Hope, but the species appears to be uncommon in the Manning Park area.

EASTERN KINGBIRD Tyrannus tyrannus (Linnaeus)

A kingbird observed at Whitworth Ranch in the Skagit Valley in early June was believed to be of this species. No specimens were taken. The western kingbird Tyrannus verticalis Say, was observed at Spences Bridge and was common between that point and Merritt in July 1945. Since records exist for this species from Chilliwack to the west coast of Vancouver Island, its occurrence in the Park area is highly probable although no observations were made by Museum parties.

TRAILL FLYCATCHER Empidonax traillii (Audubon)

These birds, were observed in the alder and willow stands about the beaver ponds and seen in the drier areas at Rabbit Flats.

The race occurring in the Park is probably E. t. traillii (Audubon).

HAMMOND FLYCATCHER Empidonax hammondii (Xantus)

A small green flycatcher observed in the coniferous forest near the 5,500-foot level at the Canam Mine site is believed to be of this species; no specimen was collected.

WRIGHT FLYCATCHER Empidonax wrightii Baird

Three small green flycatchers observed in the deciduous woods along the roadside about six miles east of the Pinewoods lodge may have been of this species. No specimen was collected.

WESTERN FLYCATCHER Empidonax difficilis Baird

This was the common flycatcher in the western reaches of the Park area. It was observed in the deciduous growth along the roadside and in willow thickets around the beaver ponds and streams. One was observed at the Pinewoods lodge. It occurred in the eastern reaches of the Park as well, but appeared more abundant in the west.

WESTERN WOOD PEWEE Myiochanes richardsonii (Swainson)

The harsh notes of the species were heard only on the Similkameen Valley bottom, near forests of spruce or lodgepole pine.

OLIVE-SIDED FLYCATCHER Nuttallornis borealis (Swainson)

The distinctive "Quick, three beers" of this bird was heard throughout the Park in summer, especially in those places where dense forests of spruce and balsam bordered on lakes, beaver ponds, and the wet meadows bordering the alplands.

HORNED LARK Otocoris alpestris (Linnaeus)

Horned larks were observed above the timberline in the Three Brothers area on August 4 and 6, 1945. No specimens were secured, and as it is believed that the birds observed were migrants, no race is postulated here.

VIOLET-GREEN SWALLOW Tachycineta thalassina (Swainson)

Violet-green swallows were observed in numbers at the Skagit Bluff on July 31, 1950 and at Dead Lake on May 26, 1945.

The race occurring is T. t. lepida Mearns.

TREE SWALLOW Iridoprocne bicolor (Vieillot)

This is a bird of lake shores and beaver ponds, where it nests over the water in woodpecker holes in dead trees. The largest concentration in the Park nests at Dead Lake. Numbers also frequent the lakes of Little Muddy Creek and Lightning Creek and Shadow Lake in Gibson Pass.

ROUGH-WINGED SWALLOW Stelgidopteryx ruficollis (Vieillot)

A pair was observed at the Ranger Station on June 13, 1949, and a few birds were seen at Dead Lake in June 1950. Though a specimen was collected at the pond, the species appeared to be uncommon in the Park area. The race here is S. r. serripennis (Audubon).

CANADA JAY *Perisoreus canadensis* (Linnaeus)

The "camp robber" is common in all forest types, especially in the alplands where the meadows are dotted with clumps of trees. It is a frequent visitor to camps, where it may become quite tame if allowed to carry away scraps from the table.

Small birds were frequently encountered noisily flying about these jays. Western tanager males were observed chasing jays on many occasions, and an excited chatter among chickadees, nuthatches, and other birds was almost invariably caused by a jay, moving silently and unhurriedly through the forest.

The race *P. c. griseus* Ridgway occurs throughout the area studied.

STELLER JAY *Cyanocitta stelleri* (Gmelin)

Steller jays were recorded only four times by summer field parties. These observations were confined to the western slopes at Whitworth Ranch in the Skagit Valley and at Robinson's cabin at Mile 21. Joe Hilton reports them more common in the winter months. There are no specimens recorded for the area, and a problem exists in the races occurring to the west, as a southern race *C. s. paralia* Obeholser is postulated as supplanting the original population *C. s. stelleri* (Gmelin). The birds occurring in the Park area may be *stelleri paralia*, intergrades between these races, or intergrades between either race and the eastern *C. s. annectens* (Baird)-- or a complex of all three races involved.

BLACK-BILLED MAGPIE *Pica pica* (Linnaeus)

Dr. I. McTaggart Cowan heard this bird near Copper Creek on August 23. It is probably rare in the Park, wandering in from the dry yellow pine forests to the north.

The race occurring is *P. p. hudsonia* (Sabine).

AMERICAN CROW *Covrus brachrhynchos* (Brehm)

Crows were not numerous in the Park area during the summer months. In late July and August of 1945 flocks of migrants were observed passing through the Princeton area.

The geographical variation here is *C. b. hesperis* Ridgway.

CLARK NUTCRACKER *Nucifraga columbiana* (Wilson)

This noisy, conspicuously plumaged bird inhabits open country, being especially numerous in the alplands during the summer months; it occurs also in the large burns. In August 1947 it was very numerous in the jack pine forests at Allison Pass, and in September 1949, it was noted in the yellow pine forests near Princeton, suggesting that it begins to leave the high country about that time.

MOUNTAIN CHICKADEE *Parus gambeli* Ridgway

This is the common chickadee in the Park area, where it occupies the Douglas fir and lodgepole pine forest. It was more abundant east of Allison Pass than it was in the spruce-hemlock forests on the western side of the range. Nesting birds were observed at Pinewoods.

The race here is *P. g. grinnelli* (van Rossem).

BROWN-HEADED CHICKADEE *Parus hudsonicus* Forster

This species was recorded only twice, once near Valley View at 6,000 feet on July 4, 1949 and again at the same place on August 27.

The geographical race is probably *P. h. columbianus* Rhoads.

CHESTNUT-BACKED CHICKADEE *Parus rufescens* Townsend

This coastal chickadee was observed in the Whitworth Ranch area, on the Skagit, at Kawkawa Lake near Hope, and at Mile 20 on the highway. Munro and Cowan list it as an occasional resident in the Dry Forest Biotic area in the winter months. From our summer observations it appeared to be confined chiefly to the western side of the area studied, although Edwards reported it common in spruce forests near Windy Joe Mountain.

The race occurring at this latitude is P. r. rufescens Townsend.

RED-BREASTED NUTHATCH Sitta canadensis Linnaeus

The red-breasted nuthatch is distributed throughout the area from Hope to Princeton. The characteristic call of this species, sight observations, and specimens were recorded by all field parties in the summer months. Edwards saw them on the summit of the highest peak of Three Brothers Mountain, at an altitude of 7,400 feet, and Museum parties observed them in the valley of the Fraser. The range of this species here appears to be limited only by the extent of coniferous forests.

BROWN CREEPER Certhia familiaris Linnaeus

Few observations of this species were made; its lisping note was heard in the timber on a few occasions. Museum parties reported no sight records or specimens. Edwards reported it "seldom seen." Based on present knowledge of the species in British Columbia, it is reasonable to assume that it occurs throughout the Park area.

The area under consideration lies between the ranges of C. f. montana Ridgway to the east, and C. j. occidentalis Ridgway, to the west. Nothing is known of the birds occurring in this area; further study should prove interesting.

DIPPER Cinclus mexicanus Swainson

This species was recorded only four times by Museum parties, although Mr. Robinson reports its regular occurrence along the Sumallo River. Certainly many of the streams in the area appear to be ideal habitat for this interesting bird. (Robinson once had a dipper descend his chimney into the hot ashes from which it was immediately rescued and released. It proceeded to the river where it began to sing.)

The race here is C. m. unicolor Bonaparte.

WINTER WREN *Troglodytes troglodytes* Linnaeus

The winter wrens occur throughout the Park area, but the population appears to be concentrated in reaches west of Allison Pass. Museum parties recorded them at the Whitworth Ranch, on the Skagit in 1947 and at Allison Pass in 1949. They were very abundant in the cedar-hemlock forests west of Allison Pass in July 1945 and at high altitude in the Timberline Valley in August of the same year. In the summer of 1949, Edwards found them abundant in the valleys of Canyon and Windy Joe Creeks. In 1950 a few were recorded in the western areas, some singing at Robinson's cabin and one at the Pinewoods site.

The race occurring here is *T. t. pacificus* Baird.

AMERICAN ROBIN *Turdus migratorius* Linnaeus

The robin occurred wherever there were clearings in the forest, while a few frequented the edge of the beaver ponds and flats by the large rivers.

T. m. caurinus (Grinnell) occurs on the western side of the range and *T. m. propinquus* Ridgway on the east. A zone of intergradation probably lies within the environs of Manning Park.

VARIED THRUSH *Ixoreus naevius* (Gmelin)

The song of the varied thrush was heard throughout the month of June and into the first week of July. It frequented the coniferous forest throughout the area. A specimen of fledgling young was taken at Pinewoods in August 1945 and young just out of the nest were observed on Lone Goat Mountain on May 31, 1947.

The race of the west is *I. n. naevius* (Gmelin), that of the east *I. n. meruloides* (Swainson). Intergradation probably occurs in the Park area.

HERMIT THRUSH *Hylocichla guttata* (Pallas)

The measured, bell-like notes of the hermit thrush were a part of the spruce forest in June. It sang from the bottomlands and as high as the spruce forest occurred. On June 25 this species was in full song at Perdue Lake (5,500 feet), and it was heard regularly in the evening at the Ranger Station in the Similkameen Valley, (4,000 feet).

H. g. oromela Oberholser occupies the range east of the Park area and *H. g. nanus* (Audubon) that to the west. A zone of intergradation may occur in the Park area.

SWAINSON THRUSH *Hylocichla ustulata* (Nuttall)

Throughout June the song of this bird was heard in the spruce forests of river bottomlands up to 4,000 feet elevation. It was not recorded from higher levels.

H. u. ustulata (Nuttall) is the race occurring on the coast, *H. u. almae* Oberholser that occurring east of the Cascades. The zone of intergradation probably occurs in the Manning Park area.

WESTERN BLUEBIRD *Sialia mexicana* Swainson

A regular summer visitor to the western reaches of the area, this species was seen only once within the boundaries of the Park. It was recorded at a point one mile west of the Pinewoods site in May 1950. Several family groups were seen between Merritt and Princeton in July 1945.

The race occupying this range is *S. m. occidentalis* Townsend.

MOUNTAIN BLUEBIRD *Sialia currucoides* (Bechstein)

All records indicate that the summer range of this species lies towards the eastern section of the area studied. The westernmost records were taken on Lone Goat Mountain and in the burnt area of the Skagit Valley, west of Allison Pass. Nesting records were secured at the Ranger Station, and at Perdue Lake where noisy young were occupying an old woodpecker hole in June 1949.

TOWNSEND SOLITAIRE *Myadestes townsendi* (Audubon)

The solitaire was found throughout the open forests of Douglas fir within the Park, both in the dry pockets, and on the high slopes bordering the alplands. They were seen at regular intervals throughout the summer.

They were recorded by Museum parties on the Skyline Ridge in Manning Park and at the timberline above Robinson's cabin where a pair exhibited courting behaviour on May 27, 1950.

GOLDEN-CROWNED KINGLET *Regulus satrapa* Lichtenstein

This kinglet occurred throughout the coniferous forest in the Manning Park area. Edwards found it most numerous in the spruce forest. Museum parties recorded the species at the Whitworth Ranch on the Skagit, at the Lightning Lakes, and in the western reaches near Hope. A bird of the upper canopy, it was seldom observed at close range. Two specimens taken at the Lightning Lakes were of the race *R. s. olivaceous* Baird which occupies the greater part of the province.

RUBY-CROWNED KINGLET *Regulus calendula* (Linnaeus)

Not nearly as common as the preceding species, the ruby-crown's rollicking song was heard in spruce forests in the spring. It was occasionally encountered in spruce, lodgepole pine, and high Douglas fir forests throughout the summer.

Singing males were observed on territory at the end of May 1950, calling from deciduous growth along the highway six miles east of Pinewoods.

R. c. calendula (Linnaeus) is the race occuring east of the coast and Cascade ranges while *R. c. grinnelli* Palmer occurs on the west. Intergradation may occur in the Park area.

ALPINE PIPIT *Anthus spinoletta* (Linnaeus)

This species nested in the highest alplands on the summits of Frosty and Three Brothers Mountains. On July 28, 1949 several pairs were observed on the west shoulder of Frosty Mountain, among the last stunted larches. One excited bird carrying insect larvae was obviously feeding young.

Flocks of up to twenty birds were observed in the Three Brothers area in August 1945 and 1949 were probably migrants.

The race occurring is *A. s. pacifica* Todd.

CEDAR WAXWING *Bombycilla cedrorum* Vieillot

Small flocks of waxwings were found throughout the Park from Copper Creek to the burns at high elevations. They seem to prefer open habitat and were not seen before July, becoming most numerous in August.

SOLITARY VIREO *Vireo solitarius* (Wilson)

This vireo was positively identified only at the Whitworth Ranch on the Skagit and in the dry pocket near Bonnevier Creek.

Vireos were observed on several occasions, but identification is often uncertain with birds of this genus due to their habit of hiding in the tree tops and often remaining silent.

The race occurring here is *V. s. cassinii* Xantus.

RED-EYED VIREO *Vireo olivaceus* (Linnaeus)

A vireo believed to be of this species was observed in low deciduous shrubbery along the Sumallo River near Mile 22.

WARBLING VIREO *Vireo gilvus* (Vieillot)

Warbling vireos were heard in May and June at the Whitworth Ranch on the Skagit, and in deciduous growth along the highway from Hope to Mile 21. Edwards reported hearing this bird occasionally in the cottonwoods and willows bordering the Similkameen River in Manning Park at elevations up to 4,000 feet.

The race occurring in British Columbia is *V. g. swainsonii* Baird.

YELLOW WARBLER Dendroica petechia (Linnaeus)

This warbler is a common inhabitant of the deciduous shrubs that bordered many beaver ponds and parts of the shores of some lakes. A young bird, just out of the nest, was found near the base of Windy Joe, in the Similkameen Valley, on July 18, 1949.

It occurred throughout the area studied from the Whitworth Ranch on the Skagit to Princeton.

Two races postulated for British Columbia are regarded as one by some authorities. D. p. petechia Linnaeus is alleged to occur in the interior D. p. rubiginosa (Pallas) on the coast.

AUDUBON WARBLER Dendrioca auduboni (Townsend)

One of the commonest warblers in the Park area, the Audubon warbler was found in open forest types throughout the Park.

The race occurring in British Columbia is D. a. auduboni (Townsend).

BLACK-THROATED GRAY WARBLER Dendroica nigrescens (Townsend)

Though difficult to see, this bird fortunately has a distinctive song. It was heard in late May and June from the lodgepole pine forests at 4,000 feet to the lower edge of alpine meadows at 5,500 feet near Perdue Lake.

TOWNSEND WARBLER Dendroica townsendi (Townsend)

This was the most common warbler in the Park. It was noted in all coniferous types, from open Douglas fir, to dense stands of spruce and balsam.

NORTHERN WATER THRUSH Seiurus noveboracensis (Gmelin)

Not a thrush, but a warbler, this inhabitant of wet, shrubby areas was seen but once. On May 16, 1949 one was seen at the Cambie Beaver pond.

YELLOW THROAT Geothlypis trichas (Linnaeus)

Several of these secretive birds were accidentally taken in mouse traps at the Trites Ranch in July (1949), otherwise the only observation was a pair seen six miles east of Pinewoods on May 1. They probably occur in most swampy thickets throughout the area.

The race in British Columbia is G. t. occidentalis Brewster.

BLACK-CAPPED WARBLER Wilsonia pusilla (Wilson)

This species was recorded in the Park area in late August when it appeared on migration.

The race W. p. pileolata (Pallas) was probably represented.

WESTERN MEADOWLARK Sturnella neglecta (Audubon)

Meadowlarks were recorded as "common" between Merritt and Princeton by parties en route to Manning Park. The ecological requirements for this species are obviously lacking in the area studied. Two birds seen in the jack pine forest near Pinewoods in October 1951 seemed out of place.

RED-WINGED BLACKBIRD Agelaius phoeniceus (Linnaeus)

Red-winged blackbirds were observed in May on the western side of the range at the Whitworth Ranch on the Skagit, and at the Trites Ranch in July. The distribution of this species is limited by lack of suitable habitat in the area.

The birds observed in the western section were probably of the race A. p. caurinus Ridgway.

BREWER BLACKBIRD Euphagus cyanocephalus (Wagler)

Two records exist for the area, one in June at the Whitworth Ranch, and the other in July at the Ranger Station. Lack of suitable habitat appears to be the limiting factor here.

WESTERN TANAGER Piranga ludoviciana (Wilson)

The tanager was confined in the valley bottomlands, usually below an altitude of 4,000 feet. It occurred sparsely from the western side of the range at the Whitworth Ranch, Kawkawa Lake and Hope extending eastward, with a centre of abundance apparent in the vicinity of Pinewoods.

BLACK-HEADED GROSBEAK Pheucticus melanocephalus (Swainson)

This species was observed only once; at the Whitworth Ranch in June 1947.

P. m. melanocephalus (Swainson) is the race likely occurring here.

EVENING GROSBEAK Hesperiphona vespertina (Cooper)

This species was reported common at the Whitworth Ranch in early June, in the environs of Allison Pass in July, and at Pinewoods in August. It appeared to be well represented in the Park during the summer months.

The race occuring here is H. v. brooksi Grinnell.

PURPLE FINCH Carpodacus cassini Baird

Two adult and one juvenile male taken at 5,500 feet on Mount Gordon in July, 1949, were of this species, as were birds observed at the Ranger Station by Edwards in the summer of the same year. Specimens were also collected at the Whitworth Ranch, Allison Pass, Timberline Valley, and along the road east of Pinewoods. The species appears to be well represented at all altitudes throughout the Park.

PINE GROSBEAK Pinicola enucleator (Linnaeus)

One reported from Timberline Valley in August, 1945 and a pair near Gibson Pass in August 1949 constitute the only records for this species in the Manning Park area. The race occurring here is probably P. e. montana Ridgway.

ROSY FINCH Leucosticte tephrocotis (Swainson)

This is an alpine species, inhabiting the very highest peaks in the Park where vegetation is scattered among bare rocks and snow may persist in protected places throughout the summer. Individuals were seen on Frosty Mountain above 7,500 feet, on Three Brothers over 7,000 feet along the rim, and on the top of Frosty Mountain.

L. t. tephrocotis (Swainson) occupies the eastern sections of the province in the summer months, while L. t. littoralis Baird occupies the western side. There is overlapping of ranges between these two races during the winter months. Just what their status is in the area studied in the summer months in unknown.

PINE SISKIN Spinus pinus (Wilson)

This little finch occurred commonly in the Park, usually in small flocks. It was seen from the low open Douglas fir forest to the scattered trees in the high meadows, but was present in greatest numbers about spruce forests and lodgepole pine stands. It occurred throughout the area from May through October.

The race occurring in British Columbia is S. p. pinus (Wilson).

RED CROSSBILL Loxia curvirostra Linnaeus

There is no positive record of this species in the Park area, although it almost certainly occurs there. The violently cyclic nature of the species may account for our failure to record it.

WHITE-WINGED CROSSBILL Loxia leucoptera Gmelin

White-winged crossbills were seen at all elevations in the Park up to 6,000 feet and in all coniferous forest types, but did not appear to be present in large numbers.

SPOTTED TOWHEE Pipilo maculatus Swainson

A single towhee observed on Lone Goat Mountain was probably of the race P. m. oregonus Bell, as were those observed in the Hope area.

This species appeared to be confined to the western reaches for none was seen east of Allison Pass.

SAVANNAH SPARROW Passerculus sandwichensis (Gmelin)

Savannah sparrows were observed in July in the meadows at the Trite Ranch, and at 6,000 feet in the alpine meadows in the Three Brothers area. Edwards saw them in several meadows east of Allison Pass.

The birds observed may have been one of several races which migrate through this area. A specimen taken in October 1927 at Six Mile Creek by the National Museum was of the race P. s. anthinus Bonaparte.

OREGON JUNCO Junco oreganus (Townsend)

Juncos were one of the most common birds in the Park area, occurring at the edge of all forest types and very common in the high country. Two races almost certainly intergrade in the Park area. J. o. oreganus (Townsend) occupies the wet southwestern coastal belt and J. o. montanus Ridgway occurs east of the coast range and throughout the interior.

CHIPPING SPARROW Spizella passerina (Bechstein)

This species occured in all open habitats. The population appeared to be concentrated around the edges of the high meadows where they were present from May through August and where they apparently bred.

The race occurring at these latitudes is S. p. arizonae Coues.

LINCOLN SPARROW Melospiza lincolnii (Audubon)

These birds were not common in the Park area. A few were observed by Edwards and by Museum parties around wet sedge meadows near the Lightning Lakes, at Dead Lake and at the Cambie Camp site. Edwards reported them present throughout the summer of 1949.

The race occurring over most of the range is probably M. l. lincolnii (Audubon) while in the westernmost limits M. l. gracilis (Kittlitz) may occur in migration.

SONG SPARROW Melospiza melodia (Wilson)

Song sparrows were distributed sparsely throughout the Park area. They were observed by all parties throughout the summer months when they frequented the deciduous shrubbery around low-land clearings, roads, and ponds.

In the western reaches near Hope the coastal race M. m. morphna Oberholser may occur, while to the eastwards M. m. merrilli Brewster probably occupies most of the range.

REPTILES

Reptiles are rather poorly represented in the Park proper, no doubt because of the relatively short summer season and other unsuitable biological conditions. Two snakes and one lizard are known to be present as follows:

WANDERING GARTER SNAKE Thamnophis elegans vagrans (Baird and Girard)

Generally distributed. Specimens were taken at Allison Pass, on the trail to Three Brothers (4,800 feet) and at Goodfellow Creek. Others were noted at the first Lightning Lake and from the Ranger Station to Copper Creek in the Similkameen Valley. The specimen taken at Allison Pass contained a freshly ingested adult shrew, Sorex obscurus Merriam which it disgorged during transit back to camp. With the cooling of the nights in September snakes were sometimes seen by day basking on the newly made road where they suffered high mortality from traffic.

PUGET GARTER SNAKE Thamnophis ordinoides (Baird and Girard)

One specimen only was taken near the old Forest Branch cabin below Pinewoods.

NORTHERN ALLIGATOR LIZARD Gerrhonotus coeruleus principis (Baird and Girard)

Fairly common in rock slides and dry areas bordering the highway east of Dead Lake, and also present in the Skagit Valley at the Whitworth Ranch.

Sparrow hawks were observed carrying lizards on several occasions.

PACIFIC RUBBER SNAKE Charina bottae (Blainville)

Not yet reported from the Park proper but known to occur outside the present boundaries, Rubber snakes have been reported from the following areas: Skagit Valley near the International Border and at Mile 21; Sumallo River Valley on Hope-Princeton Highway about Mile 20; Whipsaw Creek Valley, north of the Park, (J. Hilton). Specimens have also been taken at Princeton, a few miles east of the Park boundaries.

AMPHIBIANS

The amphibian fauna of the Park is not particularly rich but is highlighted by the presence of the tailed toad, Ascaphus which appears to be widely distributed. Five species of amphibians are known to occur as follows:

LONG-TOED SALAMANDER Ambystoma macrodactylum macrodactylum Baird.

Adults were found in the following localities: near the Similkameen River at Pinewoods; North Star Creek in spruce litter; near Similkameen headwaters in mountain beaver colony west of Three Brothers, and at Timberline Valley (6,500 feet elevation) in the Three Brothers area. Young adults have also been taken at Mile 12 on the Hope-Princeton Highway.

Larvae, each measuring about 17 mm. in length, were collected in a pond in Timberline Valley on August 3, 1945. Two adults from the same place measure in total length as follows--121 mm. and 87 mm.

TAILED TOAD Ascaphus truei Stejneger

Adults of this species have been collected from the following localities: Headwaters of Skagit River three miles west of Allison Pass, and one mile west of Allison Pass; Headwaters of Similkameen below Timberline Valley, Three Brothers area; four miles west of North Star Creek in mountain beaver burrow, and in a tributary to the Skagit near the old Whitworth Ranch. Tadpoles were also collected in tiny alpine streams at Buckhorn Camp (6,000 feet) and in Timberline Valley (6,500 feet). They measure in total length as follows: (Buckhorn Camp, August 1, 1945) 28.0, 28.5, 28.5, and 48.0 mm.; (Timberline Valley, August 2, 1945) 40.0 and 40.0 mm. It would appear that those of the smaller size groups are in their first year, while those in the larger size groups are in their second. The larger tadpoles had well-developed hind legs and appeared to be approaching the period of metamorphosis.

The above records extend the known range of this interesting toad in British Columbia to the eastern slope of the Coast Mountains and also indicate that the species is much more common than formerly supposed.

While in most cases the tadpoles and adults were found in streams containing no fishes, this was not always the case. Those adults taken along the headwaters of the Skagit were associated with trout waters but as a rule the toads were found near side-pools or trickles of water containing no fishes. When disturbed they jumped into the water and sat motionless on the bottom.

A female tailed toad, caught in a "Museum Special" mouse trap set along a stream one mile west of Allison Pass on August 13, 1945 measured as follows: total length 52 mm.; length of hind leg, 67 mm.

PACIFIC TREE-TOAD Hyla regilla Baird and Girard

Generally distributed wherever suitable temporary ponds are available for breeding purposes. Tree-toads have been collected or reported from the following areas: Lightning Lakes, Pinewoods, road-side pools at Mile 49, Perdue Lake (5,500-foot elevation), pool at Windy gap (6,900-foot elevation), swamp at Whitworth Ranch in the Skagit Valley.

Adult tree-toads begin to collect in breeding ponds of the valley bottom in the Park in mid-May and the males sing throughout June. On June 25, (1949) they were heard in Perdue Lake (5,500 feet) and on August 1 (1945) two were croaking in Windy Gap pond (6,900 feet). The latter individuals measured as follows: body length, 44 and 42 mm.; hind leg, 62 and 62 mm.

NORTHWESTERN TOAD *Bufo boreas boreas* Baird and Girard.

Individuals were seen in most portions of the Park visited, especially at night. Tadpoles were common in the old beaver pond below Pinewoods in early August and in a pool at Allison Pass, where they were associated with larvae of the spotted frog. Adults were first noted migrating to breeding ponds in the second week of May (1949) and newly metamorphosed toads were first seen leaving the old beaver pond below Pinewoods on August 19, (1945).

WESTERN SPOTTED FROG *Rana pretiosa* Baird and Girard

The spotted frog is of general distribution along lake and stream edges, particularly in the valley bottoms. Specimens were observed or collected at the following localities: Old beaver pond behind Pinewoods, Lightning Lakes, Allison Pass, Dead Lake, Skagit Valley at Whitworth Ranch, Muddy Creek, and Tido Camp north of the Three Brothers area.

Partly grown tadpoles were observed in the old beaver pond, at Allison Pass, and in Lightning Lakes during the last week in July (1945). Those collected measured as follows in total length: Beaver pond, 56.5 and 54.5 mm.; Lightning Lake, 38.5 mm.

FISHES

Three species of fish are found in the Park and adjoining areas as follows:

RAINBOW TROUT Salmo gairdneri Richardson

Present in the Skagit River, Similkameen River, and in Lightning Lakes. Most are of rather small size; those in the Similkameen seem rarely to exceed eight inches in length, the majority being four to six inches. Those in Lightning Lakes seldom exceed fourteen inches and here the average size of those taken is probably eight to nine inches.

Two non-breeding males taken in Lightning Lake on August 10, 1945 measured $11\frac{1}{4}$ inches and $12\frac{3}{4}$ inches in total length. They were apparently in their fourth and fifth year of life respectively according to scale examination. The stomachs contained a few amphipods (Hyalella azteca Saussure), adults of a chironomid fly and two specimens of a small clam (Pisidium medianum Sterki).

Two small trout taken on August 15, 1945 in Goodfellow Creek, tributary to the Similkameen at Mile 50, contained the following food items: 1 grasshopper, 4 ants, several midge-fly larvae, 35 black-fly adults, 1 stonefly adult, 1 hover-fly adult.

DOLLY VARDEN CHAR Salvelinus alpinus malma (Walbaum)

Present in the Sumallo and Skagit Rivers. Occasionally fish weighing several pounds are taken but the majority are small in size.

ROCKY MOUNTAIN WHITEFISH Prosopium williamsoni (Girard)

Present in the Similkameen River, mainly below the falls or gorge. Whitefish have not been reported from that part of the river system within the Park boundaries but it is quite possible that individuals will be found in this area.

BUTTERFLIES AND MOTHS

The following list has reference to species taken by us and to one or two others as recorded in the available literature.

In 1906 R. V. Harvey and R. S. Sherman made a collecting trip between Hope and Princeton over what were then known as the Hope

Mountains, part of the Cascade range east of Hope. This trail followed the Nicolum River, crossed the high ridge and descended by the Sumallo River a tributary of the Skagit, thence by Skagit Creek, on to the high plateau continuing to Whipsaw Creek to within 9 miles of Princeton. This route covered what is now within the northern section of Manning Park.

They recorded 54 species of butterflies, 41 species of Geometrid moths, and a number of Phylaenid or owlet moths.

A list of most of the butterflies is contained in the Bulletin of the British Columbia Entomological Society for September 1906, while species of moths are enumerated in the same publication for 1908.

There have been many name changes since those early years, and as the specimens mentioned are difficult or impossible to trace for verification the names have not been included here. Most of them are common and well-known species, many of which were taken by us, and are included in the accompanying list.

Mr. John Russell of Hope station published a short list in the Canadian Entomolgist for July 1910, but due caution as to their authenticity has had to be observed, especially as the specimens are unavailable for examination. Russell names 31 butterflies and 2 moths; most of these species mentioned by him were confirmed on our various trips. The 41 butterflies and 33 moths listed below include only the more obvious, and for the most part very common species met with in a more or less casual way. The majority were collected on the roadside or about the open spaces around the small lakes, sloughs, and old camp sites at an average altitude of 3,000-5,000 feet.

Butterflies

Papilio zelicaon Luc. Mountain Swallowtail.

Quite common, up to the summit of Three Brothers Mountain at 7,000 feet. The larvae were found feeding on Poison Hemlock, Cicuta vagans.

Papilio rutulus Luc. Western Swallowtail.

Common at the lower levels.

Papilio eurymedon Luc. Black & White Swallowtail.

Common at the lower levels.

Parnassius smintheus Dbldy and Hew. Clouded Parnassian.

Three Brothers Mountain.

Anthocharis sara c. *stella* Edw. Stella Orange-tip.

Allison Pass. One specimen, probably a late individual.

Colias eurytheme Bdv. Clouded Sulphur.

Fairly common along the roadsides in the Pinewood area.

Neophasia menapia F. & F. Pine White.

Pieris occidentalis Beak. Western White.

Pieris napi L. f. gen *vern. marginalis* Scud. Green-veined White.

Pieris rapae L. Cabbage White.

Oeneis chryxus Dbldy and Hew. Tawny Arctic.

Three Brothers Mountain.

Cercyonis silvestris Edw. Sylvan Wood-nymph.

Erebia vidleri Elwes. Vidler's Alpine.

Speyeria hydaspe c. *rhodope* Edw. Dusky Silver-spot.

Speyeria bremnerii Edw. Bremner's Silver-spot.

Boloria toddi Holl. Meadow Fritillary.

Boloria chariclea Schneid. Chariclea Fritillary.

Three Brothers Mountain.

Boloria epithore Edw. Western Meadow Fritillary.

Euphydryas anicia Dbldy and Hew. California Checker-spot.

Phyciodes tharos b. *pasceonsis* Wt. Pearl Crescent spot.

Phyciodes campestris Behr. Meadow Crescent spot.

Polygonia satyrus Edw. Brown Comma.

Nymphalis californica Bdv. California Tortoise-shell.

Abundant, especially about damp spots on roads.

Nymphalis milberti Godt. Milbert's Tortoise-shell.

This butterfly was sometimes noticed fluttering helplessly over a flower of dogbane. Close investigation showed that the proboscis was held in the sharp angle formed by the pairs of anthers on each of the stamens. These are so arranged as to form an arrow-like head. The tops of the anther are approximated, while the lower ends are widely separated, forming a V-like angle.

Other species of lepidoptera and several flies were seen to be trapped in this manner.

Nymphalis antiopa L. Mourning Cloak.

Vanessa cardui L. Painted Lady.

Basilarchia lorquini a. *burrisonii* Mayn. Burrison's White Admiral.

Fairly common about willow.

Strymon melinus atrofasciatus Mch. Grey Hair-streak.

Goodfellow Creek.

Strymon californica Edw. Hanson Creek.

Incisalia iroides Bdv. Western Elfin.

Incisalia eryphon Bdv. Marbled Elfin.

Lycaena heteronea Bdv. Blue Copper.

Pinewoods.

Lycaena mariposa Beak. Dusky Copper.

Lycaena helloides Bdv. Purple Copper.

Everes amyntula Bdv. Western Tailed Blue.

Whitworth Ranch.

Plebeius icarioïdes race *pembina* Edw. Pembina Blue.

Plebeius melissa Edw. Orange-banded Blue.

Pinewoods; Allison Pass.

Plebeius aquilo c. *megalo* Mch. Cascade Blue.

Three Brothers Mountain.

Glaucopsyche lygdamus b. *oro* Scud. Colorado Blue.

Skagit Valley.

Hesperia comma a. *manitoba* Scud. Canadian Skipper.

This is one of two closely allied races occurring in British Columbia. Pinewoods; Allison Pass.

Ochlodes sylvanoides Bdv. Woodland Skipper.

Moths

Hemaris diffinis e. *rubens* Hy. Edw. Snowberry Bee-hawk.

Pseudohazis eglanterina Bdv. Common Sheep-moth.

Recorded by Russell.

Neoarctia brucei Hy. Edw. Bruce's Tiger.

Three Brothers Mountain. One specimen, August 4, 1945 flying about near the summit on southern slope. This appears to be the third record for British Columbia; the other two are for Vancouver Island and Mount Cheam.

Halisidota maculata a. *angulifera* Wlh. Mottled Tiger.

At "light," Hope. (Kawkawa Lake.)

Isia isabella A. & S. Banded Wooly Bear.

At "light," Hope. (Kawkawa Lake.)

Androloma mac-cullocki Kby. Northern Forester.

Alypia langtoni Couper. Sylvan Forester.

Eurois astricta a. *subjugata* Dyar. Great Brown Dart.

Septis vultuosa Grt. Airy Quaker.

Hyppa xylinoides Gn. Common Hyppa.

At "light," Hope. (Kawkawa Lake.)

Melicleptria honesta Grt. Black-spotted Gem.

Autographa speciosa Ottol. Chocolate Silver Y.

Autographa corusca Stk. Scalloped Silver Y.

Hope. (Kawkawa Lake.)

Caenurgina distincta Neum. Range Grass Moth.

Caenurgina erechtea Cram. Common Grass Moth.

Synedoida hudsonica G. & R. Northern Arches.

Recorded by Russell.

Scoliopteryx libatrix L. Herald.

Hope. (Kawkawa Lake.)

Malacosoma disstria a. *erosa* Stretch. Forest Tent-caterpillar.

At no time a pest at the time of our visits to the Park. One or two larvae were feeding on some old apple trees at the Whitworth Ranch in 1949.

Habrosyne scripta Gosse. Scribe.

At "light." Hope (Kawkawa Lake.)

Drepana arcuata a. *siculifer* Grt. Common Hook Tip.

Hope. (Kawkawa Lake.)

Carsia paludata a. *alpinata* Pack. Alpine Carpet.

Coryphista meadi f. *badiaria* Hy. Edw. Brown Scallop.

Hope. (Kawkawa Lake.)

Eustroma semiatrata Hlst. Clouded Brown.

Lygris destinata e. *harveyata* Tayl. Banded Grey.

Lygris xylina Hlst. Phoenix.

Ceratodalia gueneata Pack. Plain Wave.

Hydriomena furcata Thun. Common Highflyer.

Pinewoods.

Xanthorhoe incursata b. *harveyata* C. & S. Vancouver Carpet.

Allison Pass.

Spargania luctuata a. *obductata* Moesch. White-barred Black.

Eulype hastata L. Argent & Sable.

Sericosema juturnaria Gn. Bordered Fawn.

Pinewoods, at "light;" Goodfellow Creek.

Semiothisa granitata Gn. Spotted Granite.

Itame fulvaria Vill. Striped Ochre.

Pinewoods. Common about *Vaccinium scoparium* on which the larvae probably feed.

Elpiste lorguinaria Gn. Three-dotted Border.

Euchlaena tigrinaria a. sirenaria Skkr. Variable Thorn.

Hope. (Kawkawa Lake.)

Campaea perlata Gn. Pale Emerald.

Pinewoods.

Pero giganteus Grosseb. Grant Umber.

Hope. (Kawkawa Lake.)

Enypia venata Grt. Variable Girdle.

Caripeta divisata Wlk. Twin-spot Girdle.

Hope. (Kawkawa Lake.) At "light," Pinewoods.

Albuna pyramidalis Wlk. Clearwing.

Quite common on flowers at Allison Pass. The larvae feed within the stem of Epilobium. Determined by Dr. T. N. Freeman.

WOOD-BORING BEETLES

The varied types of forest cover found in Manning Park provide favourable conditions for the development of wood-boring beetles. The following annotated list is reprinted from a former paper in the "Proceedings of the Entomological Society of British Columbia" by G. A. Hardy (1948) by kind permission of the editors. It is of necessity a provisional one, for not only were the early appearing species missed altogether, but the Park area will require a more extended study in order to obtain an accurate record of its beetle fauna.

The sequence of species is based on C. W. Leng's 1920 "Catalogue of the Coloeptera of America, North of Mexico," and Supplements.

Abbreviations.

Forest Branch Cabin--(F. B. C.) (= Pinewoods), Allison Pass--(A. P.), Timberline Valley--(T. V.), Goodfellow Creek--(G. C.). The North American distribution is briefly indicated: "B. C." includes Vancouver Island. "B. C. mainland" not, so far as known, recorded from Vancouver Island.

Cerambycidae - Long-horned beetles

Tragosoma depsarium var. *harrisi* LeC. Two specimens F. B. C., August 8 and 9. Flying at dusk, one in pail of water. B. C. to eastern N. America.

Spondylis upiformis Mann. One specimen. T. V., August 6. In flight by day, near newly felled *Abies lasiocarpa*. B. C. mainland, Alaska to California, and east to Labrador and Lake Superior.

Asemum moestum Hid. Four specimens, F. B. C., July 26, A. P., July 27, T. V. August 6. In flight on newly felled *Pinus contorta* and *Abies lasiocarpa*. B. C. to eastern N. America.

Tetropium velutinum LeC. One, T. V., August 6, on *Abies lasiocarpa*. B. C. south to California.

Stenocorus inquisitor L. One, A. P., July 27, on side of an old shack. B. C., N. America in general.

Leptalia frankenhaeuseri Mannh. One F. B. C., July 22, on rose flower. West coast B. C., Alaska to California.

Pachyta armata LeC. Common, F. B. C., A. P., T. V., July 25 to August 13. On flowers of *Heracleum lanatum* and *Cicuta vagans*. A mountain species of the coastal range, B. C. to Washington.

Pachyta lamed Linn. Nine, A. P., T. V., July 22 to August 5. Flying about newly cut *Abies lasiocarpa*. B. C., Alaska to California, east to the Atlantic.

Evodinus vancouveri Csy. Five, F. B. C., A. P., July 22-30. On flowers of *Heracleum lanatum* and *Cicuta vagans*. Southwestern B. C. This is the western representative of *E. monticola* which has a continent-wide distribution.

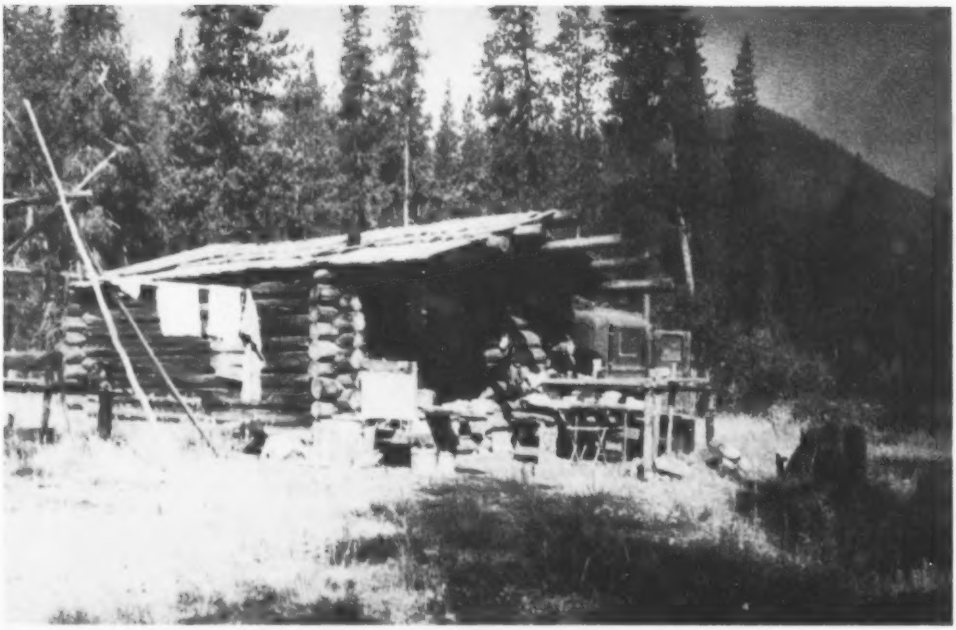

Fig. 22. Old "Forest Branch" Cabin below present site of Pinewoods.

Leptacmaeops longicornis (Kby.). Five, F. B. C., July 22 to 23. On rose flowers. Interior plateau region. B. C., south to Colorado.

Cortodera coniferae Hopping. T. V. and Skyline Trail, July 1945. Identified by H. B. Leech. The type was taken at Merritt, B. C., while the species has been recorded from Colorado and Washington. The food tree is Englemann spruce.

Acmaeops pratensis (Laich.) Abundant F. B. C., A. P., July 25 to August 13. On white flowers of the *Compositae* and *Umbelliferae*. B. C., North America in general, wherever coniferous forests occur.

Acmaeops proteus (Kby.) Nine, F. B C., A. P., T V., July 25 to August 8. On newly felled *Abies lasiocarpa* and *Pinus contorta*, also on flowers of *Cicuta vagans*. Mainland of B. C., Alaska to California and in the north to Lake Superior. Five of these are black in colour.

Gaurotes cressoni Bland. Six, F. B. C., A. P., July 22 to 28. On rose flowers. One crawling over branch of newly cut *Pinus contorta*. Southern mainland interior of B. C. to California.

Anoplodera sexmaculata (L.) Common, F. B. C., A. P., July 23 to August 12. On flowers. B. C., North America.

Anoplodera instabilis (Hald.) Four, F. B. C., A. P., July 24 to August 12. Flowers of *Heracleum lanatum* and *Cicuta vagans*. B. C mainland, east to Ontario.

Anoplodera amabilis Lec. Several specimens on flowers of spirea and cow-parsnip along the Hope-Princeton Highway near Mile 20. The host tree is Yellow pine. The type is from Steilacoom, Washington. Southern B. C. including Vancouver Island to California.

Anoplodera nigrella (Say.) One, G. C., August 16. On driftwood, edge of stream. B. C. east to New York.

Anoplodera laetifica (LeC.) Two, A. P., July 28. Flowers of *Achillea millefolium*. B. C. to California.

Anoplodera sanguinea (LeC.) Common, A. P., F. B. C., G. C., July 24 to August 12. Flowers, B C. to California, east to Pennsylvania.

Anoplodera canadensis (Oliv.) One, G. C., August 15. In flight. B. C., North America. This is the black phase.

Anoplodera crassipes (LeC.) Common, F. B. C., A. P., G. C., July 25 to August 15. Flowers of *Cicuta vagans*. B. C. to California.

Anoplodera tibialis (LeC.) Three, F. B. C., A. P.; July 26 to August 12. Flowers of *Cicuta vagans* and *Heracleum lanatum*. B. C. east to Michigan.

Anoplodera aspera (LeC.) Common, F. B. C., A. P., July 23 to 28. Flowers of *Heracleum lanatum*. B. C. to New Mexico.

Anoplodera chrysocoma (Kby.) Very common, at all stations, July 25 to August 12. Flowers of *Heracleum lanatum* and *Cicuta vagans*. B. C. to New Mexico, east to Newfoundland. Most abundant of all the species.

Grammoptera filicornis Csy. Common, F. B. C., July 22 to 23. On rose flowers. B. C. to Mexico.

Leptura obliterata Hald. Three, F. B. C., A. P., T. V., July 26 to August 6. On flowers, *Heracleum lanatum* and in flight about newly cut *Abies lasiocarpa*. B. C. to California.

Leptura propinqua Bland. Common, F. B. C., A. P., G. C., July 24 to August 12. Flowers of *Heracleum lanatum*, *Cicuta vagans*, and *Spiraea lucida*. B. C. to California, in the mountains.

Gonocallus collaris (Kby.) One, F. B. C., July 25. In flight by day. B. C. east to Lake Superior.

Xylotrechus undulatus (Say) Seven, F. B. C., G. C., July 26 to 31. Running over newly felled *Pinus contorta*. B. C. mainland and north to eastern N. America.

Monochamus maculosus latus Csy. Six, F. B. C., July 24 to 26. Flying about and at rest on newly cut *Pinus contorta*. B. C. to California.

Monochamus oregonensis LeC. Common, at all stations, July 25 to August 5. At rest on newly felled *Pinus contorta* and *Abies lasiocarpa*. Observed ovipositing in an incision made in the bark by the jaws. B. C., Alaska to California.

Buprestidae - Flat-headed wood-borers

Buprestis aurulenta L. One, F. B. C., July 24. Flying near *Pinus contorta*. B. C. to California.

Buprestis maculativentris var. *rusticorum* (Kby.) Two, A. P., G. C., July 28 to August 15 in flight. B. C. to California. The western form of the species.

Buprestis confluenta Say. One, G. C., August 15. Resting on an old log by roadside, in vicinity of *Populus trichocarpa*. B. C. mainland, east to Ontario and southwards.

Buprestis fasciata Fab. One, A.P., July 28. In flight, B. C., across continent to the Atlantic.

Melanophila drummondi Kby. Common, F. B. C., T. V., July 26 to August 6. On newly cut *Pinus contorta* and *Abies lasiocarpa*. B. C. to the Atlantic.

Anthaxia aeneogaster Cast. Common, F. B. C., A. P., July 22 to August 8. On flowers of *Rosa nutkana*, *Achillea millefolium*, *Heracleum lanatum* and *Cicuta vagans*. B. C., transcontinental.

Chrysobothris pseudotsuga Van D. Six, F. B. C., T. V., G. C., July 26 to August 6. On newly cut *Pinus contorta* and *Abies lasiocarpa*. B. C. to California.

Chrysobothris trinervia Kby. One, F. B. C., July 26. On newly cut *Pinus contorta*. B. C. mainland and transcontinental.

Agrilus politus Say. Two, F. B. C., August 13. On *Salix sitchensis*. Widely distributed throughout North America wherever willows occur.

Discussion.

Cerambycidae

The Manning Park Cerambycid fauna, so far examined, appears to contain no especially marked divergence from that of the adjoining territory, but constitutes part of a general northwest by southeast strip of a humid coastal association which for convenience of expression is known as the Vancouver strip, extending from Alaska to California and roughly includes the Cascade and Coast mountain ranges. It is, however, of local interest in that here are to be found an intermingling of the humid coastal species with those of the dry interior forms; but with the former by far predominating. From this point of view, the Park area may eventually be found to have species of the dry belt forms, which here reach their western or near-western limit of distribution.

About 12 per cent of the species are characteristic of the dry belt, and apparently reach their western limit within the area. This group includes *Gaurotes cressoni*, *Leptacmaeops longicornis*, and *Anoplodera instabilis*. Twenty-four per cent are typically humid coastal species and include *Leptalia frankenhaeuseri*, which is also an endemic genus of the Vancouveran strip, *Leptura obliterata*, *Tetropium velutinum*, and *Pachyta armata*. Fifty-three per cent or by far the larger proportion are of northern origin and of circumpolar or wide North American distribution. This percentage includes *Tragosoma harrisi*, *Pachyta lamed*, *Anoplodera canadensis*, and *A. chrysocoma*, to mention only a few.

Buprestidae

This family has much the same relation to the adjoining territory as the *Cerambycidae*. The species have a wide continental range, with the exception of *Chrysobothris pseudotsugae* and *Buprestis aurulenta*, which are confined to the Pacific coast. *B. confluenta* appears to reach its western limit in the Park area.

Summary.

Thirty-three species of Cerambycidae and nine species of Buprestidae were taken in the area during the period of July 21 to August 16, 1945.

From a distributional view point the Cerambycidae constitute about 30 per cent west coast or Vancouveran strip. The remaining 70 per cent are composed, for the most part, of holarctic elements of wide distribution and of comparatively recent specific origin. One genus, Neoclytus, is of neotropical origin. Three species are "dry belt" forms, not, so far as known, recorded west of the Park boundaries.

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OTHER INVERTEBRATES

Grasshoppers

Anabris longipes Caudell. Shield-backed Grasshopper.

These large green crickets were occasionally found on the dry grassy slopes at Goodfellow Creek. They sometimes progress by a series of clumsy hops very reminiscent of the green tree-toad; those caught under these circumstances were females. The males could be tracked down after dark by their high-pitched trill from the vantage point of one of the bushes scattered over the same grassy slopes. The ventriloquial nature of their "song" rendered accurate location very uncertain at times, particularly when abundant cover was available.

Cyphoderris monstrosa Uhler. Sand Cricket.

Sand crickets were often found in the folds of our tent on Three Brothers Mountain, evidently seeking some dark hiding place after their nocturnal revels.

Spiders

A small collection of spiders has been identified by Mr. T. B. Kurata of the Royal Ontario Museum of Zoology, Toronto, Ontario, as follows:

Round shouldered Weaver. *Aranea raji* Scopoli.

A circumpolar species found in both Europe and America.

Orb Weavers	*Aranea dumetorum* Villeys
	Aranea displicata Hentz
	Aranea diadema Linnaeus
Stilt spiders	*Tetragnatha seneca* Seeley
	Tetragnatha laboriosa Hentz
	Pityohyphantes subarcticus Chamberlin & Irie
Jumping spider	*Metaphidippus montanus* Emerton
Crab spider	*Misumenoides aleatorius* (Hentz)
	Evartica hoyi Peckham

Ticks

Wood Tick	*Dermacentor andersoni* Stiles

Several adult specimens were collected from a mountain goat taken on the northern slope of Marmot Mountain by C. J. Guiguet on May These provide a westerly record for the distribution of this species which is found throughout the interior of the Province. The wood tick is capable of producing paralysis in animals upon which it feeds.

Plankton Crustacea

The only lakes of any consequence in the Manning Park area are those of the Lightning Lake series. Judging by plankton samples taken from two of these bodies of water they are not rich in production though fishing at times is good. The following fresh-water crustacea have been identified in the samples examined:

Twenty Minute Lake, August 9, 1945.

Daphnia longispina (O. F. Muller)
Scapholeberis mucronata (O. F. Muller)
Camptocercus rectirostris Schoedler
Polyphemus pediculus (Linne)
Cyclops phaleratus Koch
Diaptomus sp.

First Lightning Lake, August 9, 1945.

Daphnia longispina (O. F. Muller)
Alona affinis (Leydig)
Polyphemus pediculus (Linne)
Diaptomus sp.

Molluscs

A few specimens of snails and slugs collected in the Park have been identified by Mr. Walter J. Eyerdam as follows:

Fresh-water snail. *Galba sumassi* (Baird.)

Common in Lightning Lake, August 11, 1945. Type specimens of this snail were collected by J E. Lord at Sumas Prairie. It ranges from British Columbia south to Utah.

Anderson's slug. *Prophysaon andersoni* (Cooper.)

On the Skyline Trail, at 6,000 feet elevation on June 6, 1947 and under small logs on Mount Gordon at 6,000 feet elevation, on July 20, 1949.

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